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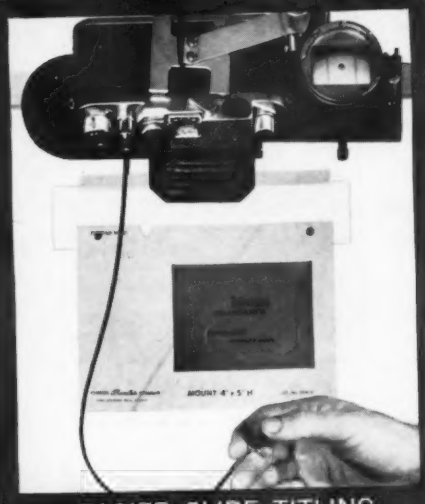

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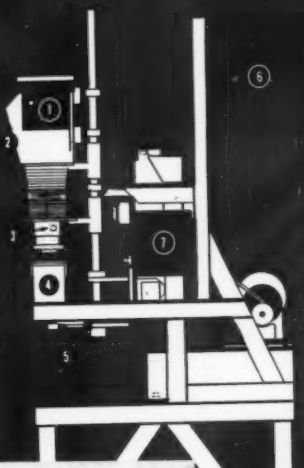

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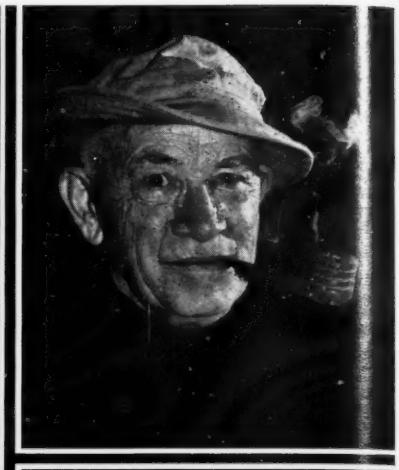

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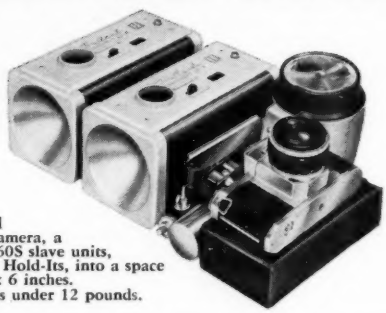
with Heiland Strobonars

The photographs above illustrate how *controlled* lighting makes the difference between ordinary pictures and truly dramatic ones. For the large picture, a Heiland Strobonar 72A was used at the camera and two Strobonar 60S slave units were placed on either side of the subject. The upper small photograph was lighted by the 72A and one 60S, while for the lower picture, only the 72A at the camera was used. Heiland Strobonars give you multiple lighting with a maximum of portability—no bulky lights to carry, no flashbulbs, and no connecting cords between units. Used whenever possible, controlled multiple lighting will make a difference in *your* pictures! Choose from a complete selection of Heiland electronic flash units, including—

STROBONAR 72A. Designed to give the greatest light output from the smallest possible size, the 72A is the most compact professional unit available! Powered by one 510V dry battery, it has a Kodachrome guide number of 45-50, delivers 600-800 flashes per battery, and cycles in 2-6 seconds. The coiled cord is detachable at both ends for extra convenience.

Complete with capacitor-forming AC cord and leather Pro-Pak (less battery).....**$99.50**

For your ***FREE*** *copy of the 16-page booklet, "Better Pictures with Controlled Lighting", write to:*



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Hold-It (for mounting 60s on light stand.).....**$ 3.95**

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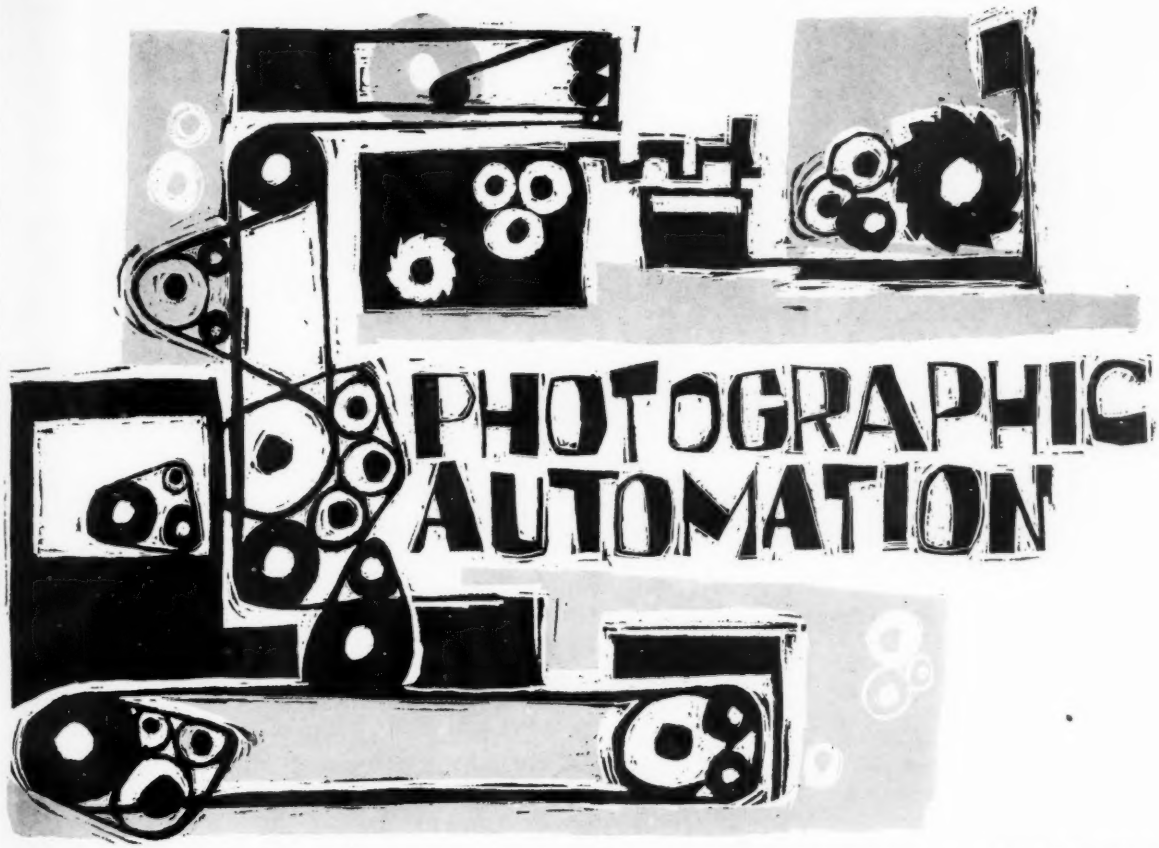

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For the past 25 years, the ROBOT manufacturers have concentrated their efforts on the development of an entire system of precision AUTOMATIC recording equipment. Built around the 3 basic ROBOT AUTOMATIC 35mm cameras, according to the construction-unit principle, the ROBOT System can be easily adapted to any photographic registration problem.

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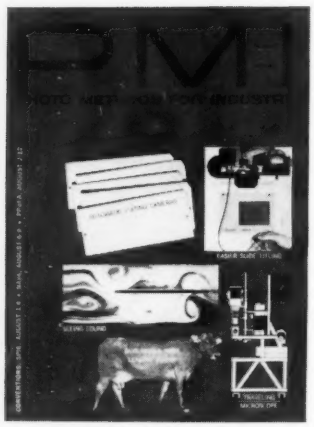

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87 NEW PRODUCTS What's new for the industrial photographer

What could possibly make a camera worth $500?

THE work you can do with it, nothing else.

The precision and resolving power, for example, that have led many studio photographers to use a Hasselblad 2¼ x 2¼ single-lens reflex instead of an 8 x 10 view camera.

The interchangeability of lenses, film backs and accessories—over 100 camera set-ups in all—that enables a professional to carry a Hasselblad instead of half his studio on location assignments.

The automatic aids that let the pro concentrate on his subject instead of the camera, and help the amateur make up in part for the intimate knowledge of light and optics that marks professional work.

Hasselblad lenses, for instance, make color and detail almost automatically perfect. These lenses have Synchro-Compur shutters and are made by Carl Zeiss of the best optical glass in the world. Resolving power—the acid test of any lens—permits greater enlargements than virtually any other lens made today.

The Hasselblad reflex system alone costs more to make than many cameras sell for. On its ground glass viewer you see a print-size preview of the quality you will get—focus, depth of field right through the lens (and no parallax). A pop-up magnifier even shows details too tiny for the naked eye.

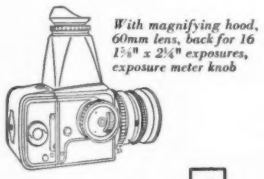
Diaphragms of Hasselblad lenses are automatic. They remain open until you shoot, so that your view cannot get away from you. If you wish, you can also stop the diaphragm down by hand.

The EVS system synchronizes diaphragm openings to shutter speeds. You simply set your lens for a code number and your speed and aperture will be automatically aligned. You can then change to any other speed and your aperture will change with it—automatically.

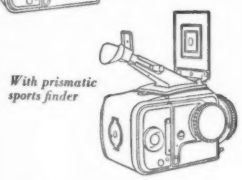
Hasselblad interchangeability? You can switch from color to black and white in mid-roll, or from telephoto to wide angle, or to a sports viewer, or to a magnifying hood for shots through a microscope. You can set up for almost every shot known to photography in seconds.

What could possibly make a camera worth $500? The work you can do with it, nothing else. With Zeiss Planar 80mm f/2.8 lens, $489.50.

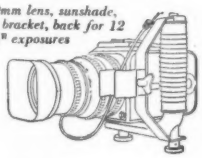
Write Dept. HPM-7 for literature and the name of your nearest Hasselblad dealer. PAILLARD Incorporated, 100 Sixth Avenue, New York 13, New York.



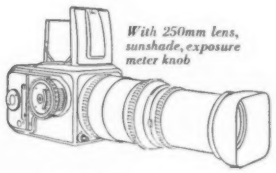
With magnifying hood, 60mm lens, back for 16 1⅝" x 2¼" exposures, exposure meter knob



With prismatic sports finder

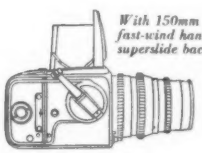


With 150mm lens, sunshade, flash gun bracket, back for 12 2¼" x 2¼" exposures



With 250mm lens, sunshade, exposure meter knob

With magnifying hood, cut film adaptor and holder



With 150mm lens, fast-wind handle, 2" x 2" superslide back

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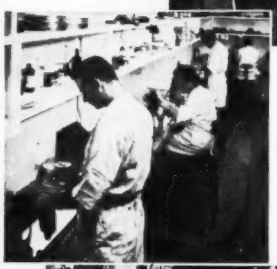

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F.Y.I.

Readers with long memories and large magazine files may remember PMI's *Spy in the Sky* (July 1959) about Dave Rush's ACR II camera which photographed the earth from 700 miles up. This talented photo engineer-designer, well-known in photo circles, was introduced to the public at large on the Dave Garroway show recently. According to NBC, a good time was had by all.

Incidentally, the growth of instrumentation was vividly illustrated by the 1959 Annual Report of the Instrument Society of America which now has over 12,000 members in the United States and Canada. This year's summer conference will be in San Francisco in May with the Annual Meeting scheduled for New York in September.

At Beckman & Whitley, one of the major producers of instrumentation devices, Bob Shoberg (Robert D. if you want to get formal), has been appointed manager of Camera Products in the Instrument Division. A member of SPSE, SPIE, SMPTE and ISA, Shoberg was formerly with Wollensak and Fairchild.

Expansion, expansion, expansion. Saul Jaffee, President of Movielab Film Laboratories, reports that they are adding more space to provide facilities for both Movielab and its subsidiary, Movielab Color Corporation. Located at 619 W. 54th St., New York, N. Y., they offer complete 16mm and 35mm processing, cutting, storage, etc. in both color and black-and-white. Jaffee also announced the appointment of Walter G. Eggers as vice-president of Movielab Color. For the past six years, Eggers has been in charge of quality control at Movielab.

Our normal routine was disrupted slightly due to the absence of Ramon Rustia, our managing editor in charge of normal routine. Ray, who on occasion doubles as a roving reporter whenever we need someone to rove, journeyed all the way to 34th St. (our office is at 60th St.) to attend the first Florman and Babb Animation Film Seminar and Workshop.

Along with the redoubtable Mr. Rustia, the seminar included 75 assorted photographic types, gathered from such places as Trinidad, Seattle, Winnipeg, Florida and New Mexico. They represented industry, the armed forces and government agencies, all in New York for the four-day session.

The group visited film studios, under the guidance of Charles Lipow of F & B, plus investigating new techniques and equipment in the field. Warren Portman, lead-off man, discussed the uses of various cameras, the Triplex and Advanced Animation Techniques. Other speakers included Mary Ellen Bute, art director at Ted Nemeth Studios discussing The Storyboard; Peter Cooper of Robert Lawrence Animation on Creative Problems and Arthur Florman on Economic Aspects of Animation Film Production. Ernest Pittaro, author of *TV and Film Production Data Book* covered General Aspects of Animation Film Production. Vic James of Arriflex demonstrated the use of this camera in animation.

Word around is that F & B were quite pleased with the success of the first seminar and are planning a second seminar shortly. For those readers interested, we promise to report latest developments as soon as we get word.

It seems that in our story on 8mm sound, we inadvertently slighted the Cinesone equipment made by Federal Manufacturing and Engineering Corp. We stated that delivery and price data were unavailable. Now, we are told that this information was available all the time. It may be that mail service between Long Island and New York is not all it should be. However, here is the missing information on Cinesone:

Delivery, of course, is immediate since the unit has been manufactured since 1953, claimed by FME to be the first unit of its type on the market. The Cinesone sound recording and playback head is $49.50; the complete unit with amplifier is $129.50. It can be used with both 8mm and 16mm projectors. For further details, contact Federal Manufacturing & Engineering, 1055 Stewart Ave., Garden City, L. I., N. Y.

(*continued on page* 8)

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WIDE-ANGLE AND TELEPHOTO—Five additional quick-change Zeiss lenses cover anything from a 90° wide-angle shot to a 250mm tele picture. This means you can take pictures that cover a lot of ground, even when shooting in cramped quarters. Distant, inaccessible subjects can be brought close-up in pictures that show intimate detail. *No extra viewfinders needed.*

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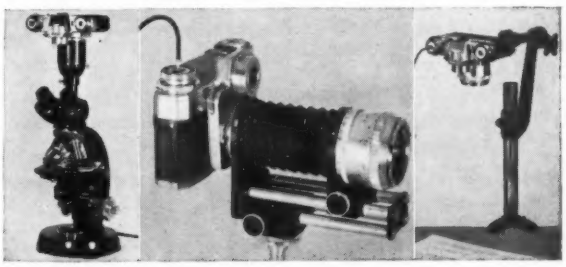
SUPERIOR EXPOSURE METER of advanced design. Its sensitivity can be increased *16 times* (4 lens stops) by simply removing the baffle. It is coupled to shutter speed and lens diaphragm—you can pre-select either. Correct exposure is assured.

AUTOMATIC SYNCHRO ADJUSTMENT—Fully synchronized focal-plane shutter has speeds to 1/1000 sec. Each speed is color coded, and synchronization adjusts automatically as shutter speed is selected.



You can attach your Contarex to a microscope with an inexpensive accessory, or mount it on a copy stand for pictures of documents, plan drawings or small objects. For macro pictures there's a bellows attachment that gives up to 2x magnification.

$450 with Zeiss Planar f/2, 50mm lens. Case extra.

Literature on request.

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Get more information. Circle 405, page 85

IS COLOR EXPENSIVE?

In-plant processing and printing of color on an occasional basis is expensive. Make-shift setups to produce prints larger than those for which the lab is equipped is expensive. Consistent quality and color balance when printing only a few prints per week is expensive. Processing by inexperienced personnel is expensive.

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COLOR — BLACK & WHITE

Get more information. Circle 472, page 85

F. Y. I.

(*continued from page 6*)

Did you ever wonder what makes a professional photographer click? The PPA (Professional Photographers of America) has a delightful little book with the story of the professional photographer, his training and skills and the work he does. It was designed to be distributed in photo studios, very much like the booklets prepared for doctors and dentists which try to show you that their bills are really not as high as they seem, considering that it costs them a fortune to send their children through medical school.

Odds and ends

Gevaert announces that Gevalure, recently discontinued, is now out of stock. Orders for this very fine paper can no longer be filled.

Agfacolor negative film has been reduced in price, according to Agfa, Inc. New prices are $1.95 for Agfacolor CN 14 and CN 17 in 35mm 20 exposure rolls and $1.25 for Agfacolor CN 17 in 127, 120 and 620 sizes. Print prices have also been reduced: 2½ x 3½ prints are 20¢; 3½ x 3½ and 3½ by 5 are 29¢. Also in the works is custom finishing for professionals, home processing kits and the licensing of additional finishers (Perfect Photo is the only Agfacolor finisher at present licensed in the U. S.).

Beckman & Whitley announce a consulting service for high-speed photo instrumentation, headed by Peter J. Van Zandvoord. Organized around Dynafax and Magnifax cameras, companies may hire needed manpower and equipment for special needs. Rates are based on $200 per day for Dynafax, $100 for Magnifax.

Beckett and Leonetti, a West Coast firm, offer lighting consultation service. Either they set up the lights and you shoot, or they will do both.

UCLA is offering a filmed lecture series on Ballistic and Space Vehicle Systems. Consisting of 21 lectures with a total running time of 28 hours, the series is available for $2,500 rental. For details, check with Department of Visual Communication, UCLA Extension, University of California, Los Angeles 24, Calif.

If you ever get tired of shooting against the same old industrial-type backgrounds and feel like using a more romantic scene, try Renato's, an Italian restaurant in New York's Greenwich Village. For the price of a credit line, you can shoot in their garden, dining room or kitchen. If

(*continued on page 74*)

the inherent versatility that works for you in the **NIKON F**

When you first look at a Nikon F, you can't help but be impressed by its orderly, uncluttered appearance. It has the unmistakable look of quality and precision. You pick it up and sight through the finder, and you're equally impressed by the brightness of the image—the ease with which it focuses. You try it—the film advance lever, the depth-of-field previewer. You fire the shutter once or twice. You are now even more impressed than before—the automatic operation, the effortless ease and speed with which it handles and responds.

These are qualities of the Nikon F which you discover immediately. But, there are others, less apparent, which are no less essential.

Probably the most important feature of the 35mm reflex is the finder system—the pentaprism and the screen. Let us consider them individually. As valuable as the eyelevel pentaprism finder has proved to be, there are instances when its use is less than ideal. For example, where conditions require shooting over the heads of people in a crowd, a waist level type would certainly be more practical. Similarly, for astro and micro-photography, most users prefer the waist level type with its magnifier. *The fact that the Nikon F is equipped with a removable pentaprism which can be easily and quickly interchanged with a waist-level finder, is an example of the versatility built into the Nikon F.*

Now, the focusing screen—its purpose is to allow you to focus accurately, to compose and frame the picture, to observe, and even to select desired depth of field. Some cameras offer a screen with a central split-prism rangefinder as an added aid to focusing. Others have a matte-ground center spot. One camera has a screen in which the area used for focusing is so small, that it is virtually impossible to observe depth-of-field.

While the type of screen desired is, for the most part, a matter of personal preference, there are applications for which one type is actually more suitable than another. Many find the matte-spot type superior to the split-prism for use with long focus lenses; while for photography through optical instruments—microscopes, telescopes, etc.—a clear central spot screen is generally preferred because it permits aerial focusing. *The fact that there are three screen types available for the Nikon F—split-prism, matte-spot and clear-spot—and that they are all readily interchangeable, is another example of the versatility built into the Nikon F.*

The split-hair accuracy of the Nikon F finder system deserves special attention. *One*—no matter what the angle at which the camera is held—even upside down—the mirror always returns to the same precise focusing position. *Two*—no matter what screen is used. The finder area is precisely the same as the area of the film aperture in the camera; *the image recorded on the film is precisely the same as the image seen in the finder—no more, no less.*

Some of these features may or may not relate to your immediate needs. Yet, they become of utmost importance when certain situations arise. In any case, they do demonstrate the caliber of thinking, the foresight and the effort that have gone into making the Nikon F a quality instrument of almost unlimited versatility—an invaluable tool, always ready to work with you, and help you meet and cope with any picture challenge.

See the Nikon F at your Franchised Nikon Dealer—$375 with f1.4 Auto-Nikkor lens; $329.50 with f2. For literature, write Dept. PM7.

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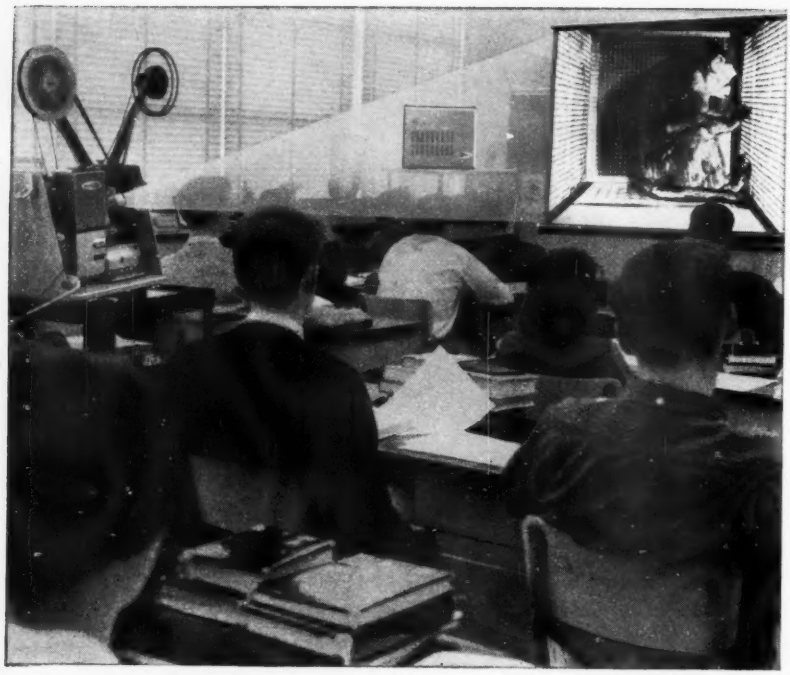


New Kalart/Victor Improves 16mm Programs 3 Ways

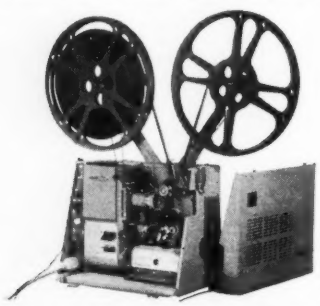
This classroom photograph reveals three common audio-visual problems – and how they are best solved by the new Kalart/Victor.

1. *Hard-to-darken room.* Only a projector with the *superior* light output of the Kalart/Victor could assure adequate screen brightness. Its redesigned shutter alone increases light output 12%. For even more light, a 1200 watt lamp may be used.

2. *Distracting Projector noise.* The new Kalart/Victor is the quietest running 16mm sound projector ever built. Even students closest to the projector are undistracted.

3. *Choice in speaker placement.* While the speaker is next to the screen in this classroom, the film could have been shown without ever removing the speaker from the projector. Only Kalart/Victor offers the new *door-mounted speaker* which can be left closed on the projector, or detached.

Other major Kalart/Victor improvements include truly magnificent sound quality, once-a-year lubrication, and brighter than ever stills. Choose from models with 15-watt or 25-watt amplifier. Ask your authorized Victor Dealer for a demonstration soon.



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LETTERS

To the Editor:

I am a little confused on the article in the March issue of PMI on connecting electronic flash units for multiple firing.

As I understand it, the question was about units in series—and you answered it about units connected in parallel. I am operating three Amglo 60A units in series and they work fine.

I like your magazine very much and it's a great help in my business.

R. E. (Buster) Hogan
Talladega, Ala.

Generally a photographer should not connect electronic flash trip circuits in series.

In the case of the Amglo 60A units, connecting the tripping leads in series would add up the trigger voltages of about 160 volts per unit, thus putting about 480 volts across the shutter contacts. (You could check this with a high resistance voltmeter of 20,000 ohms per volt or a VTVM.) In some cameras you could feel the tingle when touching certain parts simultaneously. The 60A happens to have its grounds all insulated from the case, but in other models one would get a slight jolt at the time of firing with series connection and holding a unit in each hand, or the lamps would not fire if clamped to a common ground such as steel beams or pipes.

When connecting trip circuits of a number of flash units in parallel, most difficulty is caused by failure to observe polarity. This done, it is far safer procedure than connecting units in series. — Edward R. Farber

To the Editor:

I enclose with this letter a marked card, published in your magazine.

On page 33 of your January, 1960 issue you have a note about industrial dealers. We would be glad if you would put us in touch with them.

We are the first television station in Africa and it is a joint project of the Western Nigeria Government and Overseas Rediffusion of London. We have been in operation for five months and are just finding out the types of equipment and services we really need.

We are very much interested in industrial photographic instrumentation methods and services and

(*continued on page 92*)

COMING UP

AUGUST 1-4 Society of Photographic Instrumentation Engineers Convention, Los Angeles, Calif.

AUGUST 6-9 National Audio-Visual Convention, Morrison Hotel, Chicago, Ill.

AUGUST 7-12 Industrial Division PPofA Conference, Conrad Hilton Hotel, Chicago, Illinois.

AUGUST 15-19 High-Speed Seminar at MIT. Stroboscopic Light Laboratory, Cambridge 39, Mass.

SEPTEMBER 21-24 First Annual Photo Journalism Conference in the West, sponsored by ASMP, Asilomar, Calif.

SEPTEMBER 26-30 Instrument Society of America Instrument-Automation Conference and Exhibit, New York, N. Y.

MONTHLY MEETINGS

Association of Federal Photographers Meetings every third Wednesday at 8 p.m. G.S.A. Building, 7th and D Sts., S.W., Washington, D.C.

Cleveland Chapter SPSE Meetings the first Tuesday of each month. Cleveland Engineering & Scientific Center, 3100 Chester Ave., Cleveland, Ohio. Contact Robert E. Birr, General Electric, Nela Park, Cleveland, Ohio. GL 1-6600.

Rochester Chapter SPSE First Monday. Contact Woodlief Thomas, Jr. Color Technology Division, Building 65, Kodak Park, Rochester 4, N. Y. CO 6-2500.

Industrial Photographers of America Essex House, Newark, N. J. Meetings every second and fourth Thursday. Contact Tom Holbarton, 181 Lake Drive West, Packanack Lake, Wayne, N. J. Or R. Handley, The Port of New York Authority, 11 8th Ave., New York 11, N. Y. AL 5-1000, Ext. 605.

National Visual Presentation Association, Inc. New York City. Meetings every second Thursday. Contact M. E. Schack, 19 West 44th Street, New York, N. Y.

New York Chapter SPIE Meetings every third Thursday. Contact Don Bass, P.O. Box 177, Bethpage, L. I., N. Y. Liggett 4-8196. **New York City Chapter SMPTE**

(*continued on page 92*)

REPRODUCTION TRENDS

To prove how a POST *Tuf-Tex print stands up under wear and tear, we put one through the washing and drying cycle of this automatic laundry equipment. The print did not tear, lines remained crisp and black, it gave excellent reproduction as an intermediate.*

"Locked-in" black image on polyester film is virtually indestructible

When polyester-based films such as DuPont's Mylar first became available in 1957 for reproduction uses, a multitude of interesting applications developed quickly. Polyester film's twin benefits of remarkable dimensional stability and high strength durability offered challenging opportunities in creating new types of reproducibles.

Since the broadest reproduction activity involves use of ammonia process diazotype equipment, POST researchers concentrated initially on developing a solution and a technique to coat polyesters to produce a "locked-in" black image on direct positive diazo printers. Now . . . almost two years later, satisfied users hail the resulting product, Vapo Tuf-Tex (POST 208PE), as unmatched by any other polyester reproducible.

Merely run 208PE through any whiteprinter . . . quickly you have a virtually indestructible blackline intermediate. Just one pass does the job . . . no extra steps, no negatives, no muss. (When extremely accurate scale is desired, use of a vacuum frame is recommended to avoid the slight dimensional change that may occur in a rotary printer.)

The resulting print is truly outstanding—a dense black image on a clean background without the discoloration (due to residual chemicals) that characterizes some other films. Thus Vapo Tuf-Tex prints have excellent readability of even the finest detail and produce top grade printbacks at faster speeds than ordinary intermediates.

Long shelf life

An added bonus built into the special formulations used in POST Controlled Coating techniques for 208PE is its remarkable shelf life—an important consideration for the careful buyer investing in polyester based reproduction material. Tests show that Vapo Tuf-Tex has keeping characteristics equal to the excellent shelf life inherent in POST's paper based Vapo products.

Regardless of abuse in use, a Tuf-Tex print still retains its strength, its drafting surface and its remarkable printback qualities. The blackline image remains sharp and black on the glossy side, the reverse-side matte surface still invites pencil or ink work. Print images can be conveniently removed with a special single-stage eradicator (POST No. 240).

Vapo Tuf-Tex comes in base material thicknesses of .003 in. (208PE-L) and .005 in. (208PE-M).

For information on Tuf-Tex, see your local POST *blueprinter, or write to Frederick Post Company, 3660 N. Avondale Ave., Chicago 18, Illinois.*

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by Lloyd E. Varden

PHOTO METHODS FOR TOMORROW

New document reproduction idea: applications are guessing game

The Society of Photographic Scientists and Engineers held their Annual Conference in Santa Monica, California, from May 9 through May 13, 1960. I could not attend, but one of the papers described to me later concerned a new procedure for document reproduction that should be of interest to industrial photographers. It was presented by Mr. P. M. Cassiers of the Gevaert Research Laboratory in Mortsel (Antwerp), Belgium under the title *Electrothermography—a New Electrostatic Printing Technique.*

Principles of new technique

Both thermographic and electrostatic concepts are utilized in the new printing technique, plus an additional "wrinkle" that ties these two concepts together to form a new printing method. The sheet of paper on which the copy is produced has a "wax" coating that is electrically conductive when its temperature is raised to a critical point but is non-conductive at room temperatures. Therefore, an overall electrostatic charge can be impressed upon the surface of the coating, as done in xerography, followed by an image-wise dissipation of the electrostatic charge by brief heating of the "wax" in those areas corresponding to the infra red absorbing areas of an original document. (The latter step will be recognized as an embodiment of the well-known principle employed by the 3-M Company in their heat-sensitive reproduction materials.) At this stage of the procedure the "wax" layer on the copy sheet has an electrostatic "image" that can be "developed" with an electrostatically charged powder, again according to the principles of the xerographic reproduction method. The final step is a heat-fusing of the developer powders to produce a permanent copy.

Perhaps a clearer picture of the new technique can be gained by going through the practical procedure, step-by-step.

Step-by-step procedure

1) A sheet of paper coated with a layer of a special compound that is normally non-conductive (electrically) but which becomes conductive when its temperature is raised has to be available. A number of compounds have this property, e.g., the fatty amides which, at sufficiently high molecular weights, have the physical characteristics of waxes. Various polymeric substances are also suitable.

2) The coated sheet is given an electrostatic charge. Mr. Cassiers recommended an electrically conductive rubber roller at a potential of several thousand volts for this purpose. The rubber roller can be made conductive with carbon impregnated rubber.

3) The "charged" coated sheet is sent through a suitably designed "exposing" machine, e.g., a 3-M Company *Thermofax* unit, in heat-conductive contact with an original document to be copied. The radiant energy absorption properties of the original document determine the heat pattern generated during this "exposure," and thus govern the heat pattern transfered to the electrostatically charged sheet. And where ever the temperature of the wax coating reaches a certain level the "charge" is lost. Elsewhere the electrostatic charge remains.

4) The electrostatic latent image on the coated sheet is "developed" by means of a special powder, the unit component of which carries an electrostatic charge. Apparently any of the methods that have been proposed for xerography or *Electrofax* are adaptable. Ordinarily these developing powder units consist of a resin particle attached to a highly efficient light absorbing particle, e.g., carbon.

5) The electrostatically charged units of the developing powder are re-

(*continued on page* 16)

HOW TO MAKE A BETTER CAMERA: CRONAR* FILMS

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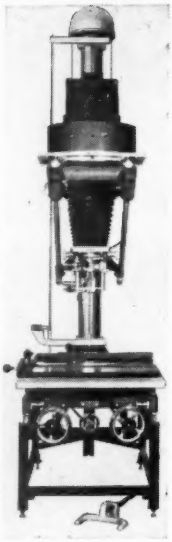

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METHODS FOR TOMORROW

(*continued from page 14*)

pelled by opposite charges on the wax-coated sheet, but they adhere elsewhere. A brief heat treatment melts the resin component of the powder units and fixes the light absorbing component, producing a permanent copy.

Merits of new technique

The practical advantages of this new double-step thermo-electrostatic document copying technique, in comparison to other document copying methods, apparently were not stressed by Mr. Cassiers during the presentation of his paper. At least, those who described the technique to me could not recall that he mentioned any particular advantages of the technique over existing document copying methods. Perhaps the Gevaert patent attorneys were breathing down his neck! Scientists (or inventors), you know, are rarely allowed to speak freely if they are employed by manufacturers, because of the censorship authority vested in their company's patent departments.

But if one is an independent in the "photographic industry" (as most columnists are) almost any opinion that he has thoughtfully derived and considers fair and just he can express without fear. (Admittedly, this freedom does get one in trouble now and then.) Therefore, please regard the following comments on the "merits" of the new Gevaert technique as purely personal opinions of mine, and mine alone.

My first offhand impressions of the technique were: (a) indeed a novel twist and clever combination of well-known principles; (b) an impractical technique, nonetheless, because its minor quality advantages over Thermofax-brand dry copy prints cannot be justified cost-wise in view of the extra steps required to produce a copy print. (I have assumed, of course, that anyone will concede that Xerox copy prints are superior in *quality* to Thermofax-brand dry prints, although the cost per print is considerably higher if only one—or just a few—copy prints are required.)

My second offhand impression is that the technique may find certain specialized applications. The electrothermographic paper used can be made so that it is light stable and reasonably heat stable, both before and after the print exposure. Its quick erasure properties, when suitable dielectrics are chosen for the paper coating, indicate potential applications in information storage and computer fields.—THE END

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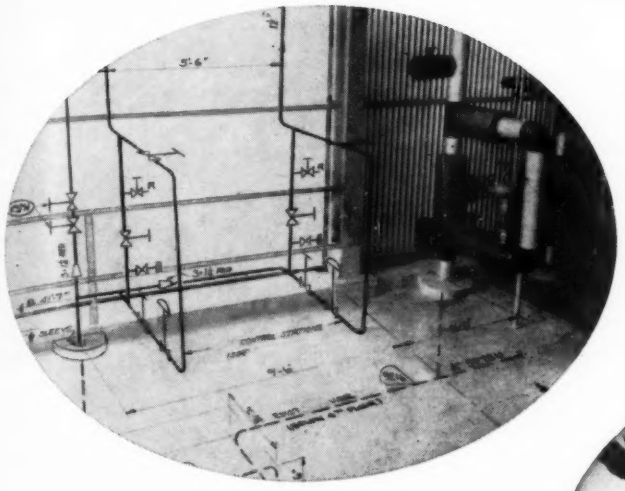

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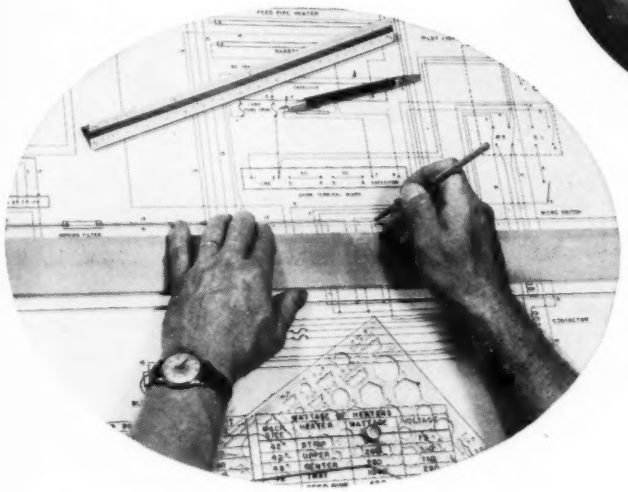

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CRONAFLEX films are now available in four types: (1) Direct Positive Film; (2) Contact Film; (3) Projection Film; (4) CRONAFLEX Drafting Films. It's the most complete versatile line of engineering reproduction films you can use. For more information, contact your Du Pont Technical Representative, or write: E. I. du Pont de Nemours & Co. (Inc.), Photo Products Department, Wilmington 98, Delaware. In Canada: Du Pont of Canada Limited, Toronto.

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by David B. Eisendrath, Jr.

WORKING PHOTOGRAPHER

More comments on methods and techniques: tricks of the trade

Last month I wrote of some of the interesting hints, tricks and gadgets shown at the National Industrial Photographic Conference last year in Los Angeles. Jim Hampson of Arkansas Fuel Oil Corp. annually conducts a program of audience participation where various members of the Industrial Division show some of the cute things they have been doing to save time, trouble and frustration. This part of the conference is usually well worth the whole price of admission, and if you find some interest in these notes, be sure to ask your management *now* to be smart enough to send you to this year's meetings. (Chicago, Conrad Hilton Hotel, August 7-12).

Last year Bob Goode of Hughes Aircraft showed how they made copies of wall charts in a hurry by photographing them on 4 x 5 Kodalith, then blowing these up onto 14 x 17 Kodalith and running these through a diazo machine. Several people showed how they used the 3¼ x 4 Polaroid slide binders for quick mounts with regular film when a rush job was needed.

Ted Williams of Western Electric told how they made hurry-up cuts for their company newspaper by shooting on Polaroid slide material (this makes a quick positive slide) and projecting this in an enlarger onto Auto-screen film which is then used for reproduction.

Jack Stevens of Convair showed how they made limited run posters photographically by combining photographs and type. When the photograph is enlarged, an area is held back and then lettering is double printed in photographically or sometimes silk-screened into the clear space. The posters made in this manner were most effective.

This writer also showed a number of his favorite tricks, among them a stunt from Bob Hutchinson, a top notch architectural photographer from St. Louis. Bob rivets an "L" shaped piece of brass to the top lip of a film-pack adapter slide with the long leg of the "L" extending over the slot where the film pack paper tabs come out. In this way, you can't pull a film pack tab when the slide is in—and if you use film packs you'll know how easy it is to have the paper tabs hide the slide you've left in. (You've never left one in? Liar!)

I also showed the Pixall roller, which I've described before, a small roller available in dry goods notion counters or dime stores (10¢ is a laugh these days!) which has a reel of 3-in. wide Scotch tape inside. The tape winds out around the roller, sticky side out, and lets you pick up lint and dust from velvet and background fabrics. Only I've discovered it's the best gadget ever for cleaning dust out of the inside of a view camera bellows! I also showed the Reflectal umbrella put out by Photo Lectronic Research which is a Mylar umbrella with an aluminized surface inside. Available in 42 or 72 in. these have an ideal curve for making a broad source of illumination when a small strobe unit or floodlight is directed into it. I find them excellent for giving soft fill lighting in plant areas away from reflecting walls.

Another stunt I showed was one I learned from Jimmy Laughhead the sports photographer from Dallas. Jim shoots hundreds of pictures of football players and other sport stars at various colleges. He has a problem identifying the negatives when there is such a volume and holders may be reloaded several times during one shooting session. Jim takes a film holder slide and cuts it off short and then attaches a thin piece of Lucite about .15 in. thick across the end of the cut down slide so that when it is inserted in a film holder about ⅝ in. of Lucite sticks through the light trap and over the film. By writing with a grease pencil (black or red) on the Lucite, the short slide can be inserted after the regular slide is withdrawn and the name will photograph right onto the end of the

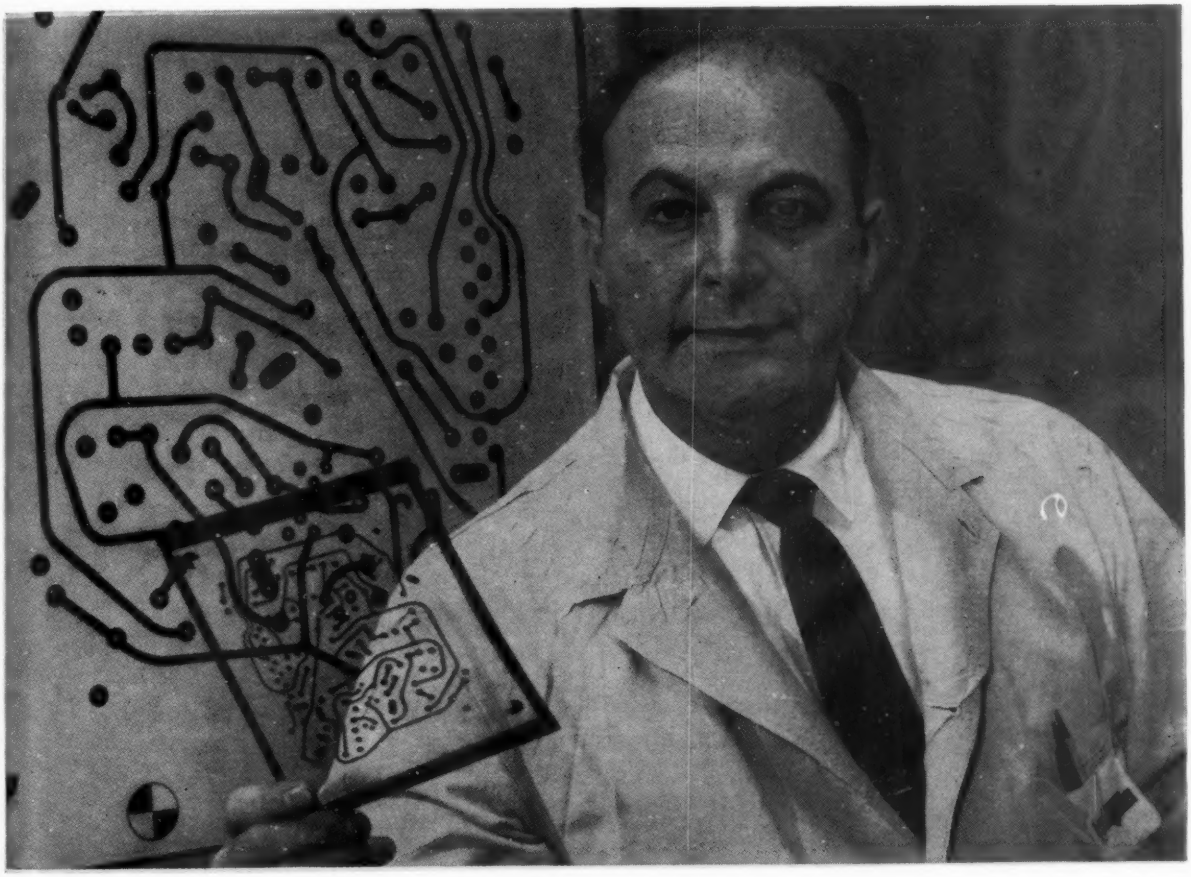
(*continued on page* 20)

"Without the effective stability of CRONAR® Ortho A, we would be faced with an almost impossible task in making printed circuits"

— Mr. Paul Kramer, Supervisor of Photography, Precision Circuits, Inc., Mount Vernon, N. Y.

Precision Circuits, Inc., ranks as one of the nation's leading makers of printed circuits. Mr. Kramer says, "Film is our critical medium. We must work with a film that fulfills the most stringent requirements: it must meet critical optical standards; must remain stable where temperatures are variable; and it must stand up under punishment in the course of processing, handling and storage. The fact that we use CRONAR Ortho A Litho Film exclusively is a tribute to this excellent product."

Another important advantage of CRONAR Ortho A: it dries quickly because its polyester base absorbs virtually no moisture. Mr. Kramer states, "If necessary, we can dry CRONAR negatives in five minutes without any residual shrinkage."



Mr. Paul Kramer holds negative on CRONAR Ortho A. In background is the master artwork. At Precision Circuits, reductions or enlargements on CRONAR must hold to a tolerance of two-thousandths of an inch.

CRONAR Films are outperforming other films in shops all over the country. There's probably an operation in your shop that can be made more efficient by one of these dependable films. For more information, or a demonstration in your own plant, contact your Du Pont Technical Representative, or write: E. I. du Pont de Nemours & Co. (Inc.), Photo Products Department, Wilmington 98, Delaware. In Canada: Du Pont of Canada Limited, Toronto.

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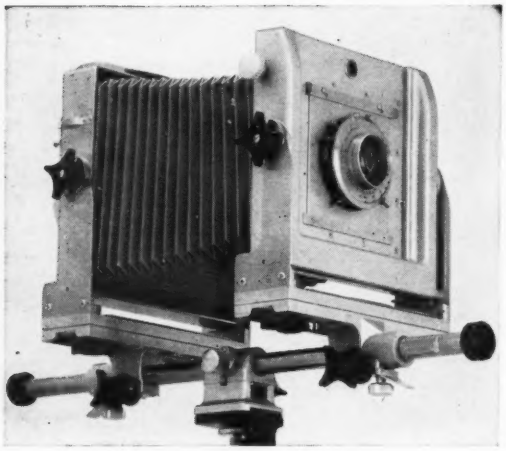

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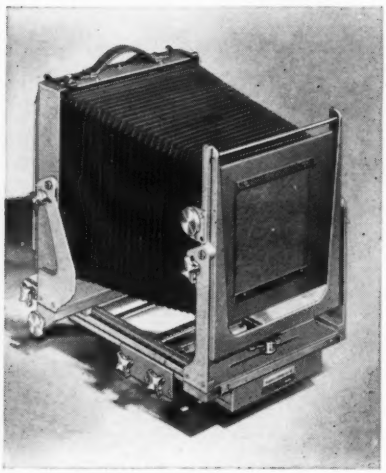

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(*continued from page 18*)

negative. The grease pencil wipes off readily and a new legend, title or identification can be added. I've shown this to many industrial photographers who have used this for positively identifying product photographs or patent record pictures. In this way there's no caption switching as it's right on each negative.

I also showed the Kenyon Stabilizer, that gyro gadget that Arnold Eagle and I have both written about that helps hold cameras steady, especially when long lenses are used.

On the subject of long lenses, Buzz Holland of North American showed how they had facilitated tracking of rapidly moving subjects by adding long boom sights to their long lenses. Just like the finder sights on a telescope, these give a modified view of the field and allow the cameraman to quickly get on-target.

Bill Hyzer the high-speed expert showed several quick tricks which may also save someone's life someday. Bill pointed out that sometime you may be out working in the field on a high-speed job and want to process a few feet of 16mm film just to check your exposure, or event timing or something like that and a darkroom may not be available. Since you usually have a good supply of film in 100-ft. cans, Bill improvises a developing tank by putting two film cans with their covers on top of each other. (See PMI, Feb. 1950, page 71 for complete details.) Not a slick stainless steel tank, to be sure. But like all these gadgets, it works in a pinch.

Bill also told how he sometimes got on location and had to buy extra film from unknown stocks and didn't know whether the pitch would be close enough to the tolerances of fresh film of proper pitch. Bill takes a piece of film known to be fresh and a piece of the film whose qualities are unknown, slips a sprocket hole of both pieces over a nail or pin and measures out 2½ ft. This is 100 frames. If the sprocket holes line up well at the 100th frame, the film is fine, if it misses a line-up by half a width of a sprocket hole it's probably within tolerances allowable (which is .0004 in.). If it misses line-up by the width of a sprocket hole (0.050) on a 100 frame test, it's obviously short pitched and not to be used.

As you can see, there's a wealth of miscellaneous information never found in books to be gleaned at the National Industrial Photographic Conference. See you in Chicago, August 7-12?—THE END

These 52 executives have an average of more than 25 years' experience in the film industry and have been with CFI Hollywood an average of over 16 years:

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by Edward R. Farber

ELECTRONIC FLASH

Not all news is new news; how to save money on speedlight repair

The sudden rash of articles on electronic flash installations in missiles makes interesting reading, but the techniques are not really new. In some areas people are apparently "re-pioneering." For example, I have before me an article from *Product Engineering* (May 23, 1960, page 15) which describes a "Signal Beacon to Ride Missiles at Night." It says, "Flashes can be optically tracked or displayed as a series of dots on a photographic plate. From this missile trajectory can be determined." The article goes on to explain that the flash is from 150-watt-seconds stored at 4000 volts in a 21 mfd capacitor, and will flash twice a second for 25 seconds. The extremes of temperature, humidity, vibration, acceleration, etc., are defined. Requirements that have not changed much since they are basic environmental conditions.

The May, 1960 issue of PMI describes in the Photo Instrumentation column a ballistic camera system based on the use in a missile of a 250-watt-second, twice-a-second flash.

Back in 1942 and 1943, the Ballistic Research Laboratory at Aberdeen Proving Ground, Md. pioneered and in later years brought to high perfection such instrumentation. Dr. L. G. de Bey, Captain Lloyd Dorsett, and this writer assisted by Dr. Harold Edgerton first used 100 and 200-watt-second, one and two-a-second flash units in planes to get range and dive bombing data at an accuracy of one foot in five miles in 1943.

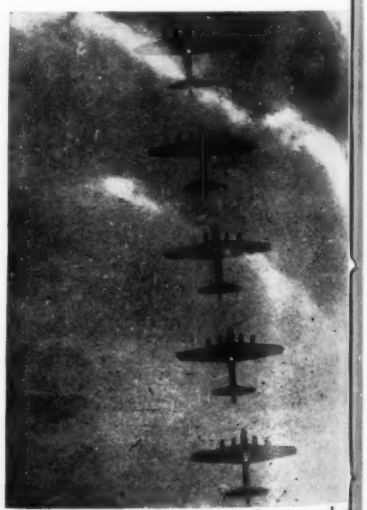
The early ballistic cameras were Goerz Aero Geodetic Cameras from Germany, placed accurately on a one mile base line, leveled within two seconds of arc.

The plane flew across the field of view at night and left a dotted line across EK Spectrographic plates.

Just as Space Technology Laboratories, Inc., is currently doing, the cameras of the 1942 installation at APG were calibrated by making st trails before and after the tests.

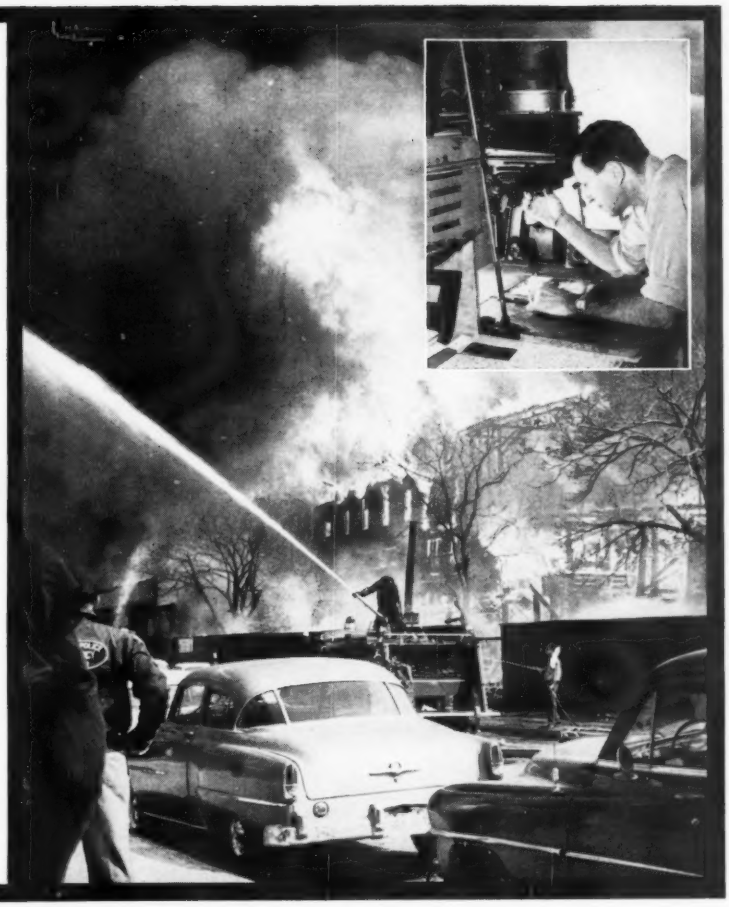
In 1943 the first flashing light wa placed in a bomb. A GE FT-14 flash tube was operated at about 18 volts at 50-watt-seconds from power supply consisting of a ban of 50 Minimax batteries. Instead controlling the flash interval with transmitter on the ground as wa done with the planes, the flashin rate was controlled by a multivi brator in the bomb. A transmitter the bomb sent a pulse with eac flash. This pulse was recorded on tape with a timing wave to accu rately read flash intervals. In orde to make it possible to get data i the daytime, later in 1943, the bal listic cameras were equipped wit rotating disk shutters which woul give an exposure once or twice second as desired. A capping shut ter would open. A phototube picke up a pulse when the shutter was i open position and triggered a trans mitter pulse to the plane receive which in turn tripped the light o the plane in sync with all the cam eras. (See picture for very low alt tude pass to indicate manner i

(*continued on page* 24)



Flashes appear as white dots on plan

WHY ONLY BESELER MET ENLARGER REQUIREMENTS FOR NEWARK, N.J. NEWSPAPER



Ralph Detrick took over as Chief Technician of the Newark Evening News darkrooms 12 years ago. By 1953 the production of an increasing volume of enlargements from a wide variety of negative sizes and under tight deadlines posed 3 basic darkroom problems that required replacement of their professional arc light enlarger. Only Beseler 45MCR-X's solved these problems . . . and continue to do so after 7 years of constant use:

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2. The Beseler 45MCR-X's with their sliding filter drawers over the lens made optically accurate changing of filters for polycontrast papers a simple, routine procedure.
3. The Beseler 45MCR-X's with their convenient horizontal positioning that swings the entire enlarger and locks in at precisely 90° permitted virtually instantaneous switching to wall projection for oversized prints — without even replacing their standard 50mm lenses.

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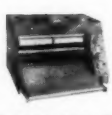

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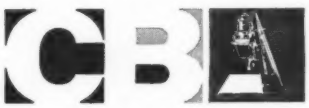

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ELECTRONIC FLASH

(*continued from page 22*)

which data was recorded. Normally the plane would be at high altitude and therefore not visible on plate. Note that two flashes are missing. These were coded out so that all data can be correlated easily.

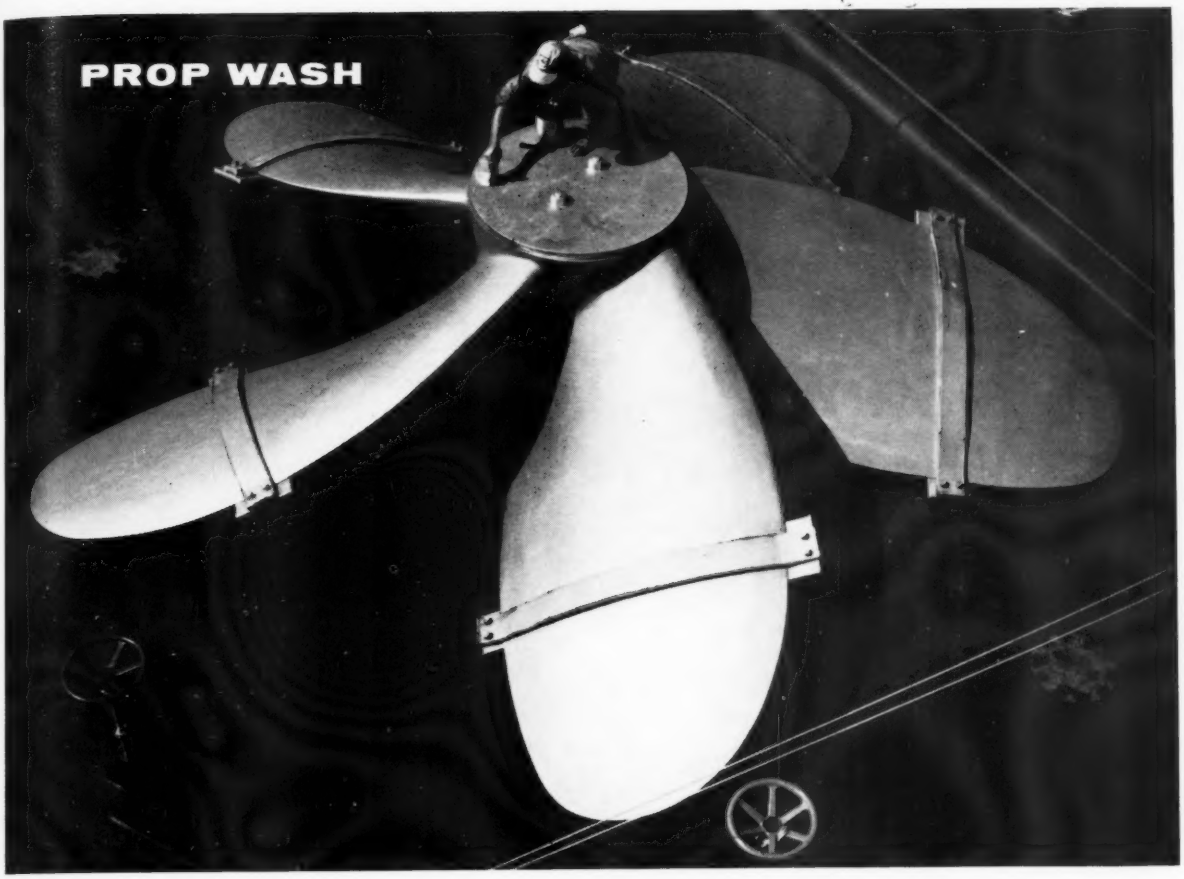
In 1954 Strobo Research was commissioned to build a flashing light unit for a Corporal Missile. This 4000-volt flash unit operated three quartz lamps, one in the nose and two on fins so that spin and yaw of the missile could be observed. These flashed three flashes a second for the first 98 seconds and once a second thereafter for 2000 flashes. The light was observed with the naked eye for as far as 120 miles away.

Photographers complain loud and long about poor service on electronic flash repairs, and with some justification accuse manufacturers of a "sell and forget" policy.

But often much delay can be avoided if a few simple rules are always followed when sending in equipment.

1. Tag all parts with your name, address, and date.
2. Make a list of what you are sending.
3. Write a letter telling what the problem is and under what circumstances the trouble occurred. This can save you time and money. Many times trouble is not obvious to service man. He might have to spend an hour to find out that your complaint is due to an intermittent short in a trip connector. Just some explanation as to nature of problem will help.
4. Be as specific as possible. State if you do or do not want dry batteries replaced, for example. State if unit is still under guarantee and where you purchased unit.
6. Tell how you want unit returned. (Air parcel post, express, etc.)
7. Pack twice as carefully as you think necessary.
8. Insure adequately.
9. Send letter telling how and when you sent unit along with all other instructions and packing list.
10. Put copy of letter on outside of package. (Envelope needs first class postage for parcel post.)

Remember that billing or credit information of some sort may be necessary—or in lieu of this, give permission to send C.O.D. If you want an estimate before repairs are made, say so clearly.—THE END



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Get more information. Circle 418, page 85

by Arnold Eagle

INDUSTRIAL MOTION PICTURES

To move or not to move depends on the film maker's skill, needs

Advice can be very confusing, especially for beginners. For example, one of the first pieces of advice given the novice movie-maker is: "Don't pan; don't move the camera." This point is emphasized in every book and article on how to make movies.

Generally speaking, this is sound advice. There is a need to restrain the wild enthusiasm for camera movement which can make even the most loyal relative seasick. However, this advice could have an inhibiting effecting on the later development of a movie-maker. The primary reason for giving and repeating this injunction against panning is that the technique of smooth panning and camera movement is difficult. It demands a great deal of care, plus the practical experience and knowledge which the novice, by definition, does not possess. Nothing destroys the illusion of reality on the screen more than a jerky pan. There must also be a logical, cinematic reason for panning. Thus, the advice not to pan is suitable for beginners. For them, it is valid and realistic in terms of their limitations.

It is when experienced film makers follow this advice that it backfires. Movement is the very foundation of motion picture techniques. It is the most exciting and effective technique that the movie maker possesses. Camera movement has the same visual effect on the audience as cutting: it provides the restless eye with new territory to explore. By proper use of movements and cuts, lagging attention of your audience can be revived. When either subject or camera is moving, new visual interest is created. This creation of visual interest is, as we have remarked in previous columns, the prime purpose of a film. It must keep the audience's attention focused on the screen.

Other effects to simulate movements which keep the attention of the audience can be used: sound effects and music; varying the length of the cuts; montage, where still pictures acquire movement from their relationship with one another. The simplest and most effective effect of movement apart from subject movement is camera movement. The pan, the tilt, the dolly and the travel shots are, figuratively, the life-blood of film making.

The most logical reason for panning or tilting the camera is to enable the camera to follow the subject of interest from one spot to another. Most of the time, this type of movement remains unnoticed by the viewer. The audience is not *consciously* aware of camera technique because its attention is completely concentrated on the subject. The degree of concentration is such that a moderate flaw in camera movement would not even matter.

This is about the only time that a cameraman can try a hand-held shot. (This is only true when the camera pan follows the subject; when the pan is on a still object it must be perfect.) Only minor flaws, such as an unsteady frame line, will escape attention. If the camera movement is jerky and not synchronized with the movement of the subject—losing it, searching for it, losing it again—the viewer will be very upset. Reason one for panning, therefore, is to follow the subject.

A second reason for panning is to explore a new scene. This is especially useful when the film maker wants to acquaint the audience with a new location. It is more effective than a straight long shot because a moving shot can be kept on the screen much longer than any still shot—as long as the subject or the camera moves. The pan permits the camera to come in closer to its subject than if it had to take in the whole scene at once. It acts like a guide on a tour, saying, in effect, to the audience: "I want you to examine this closely."

A pan or tilt must have a definite reason and never stop aimlessly.

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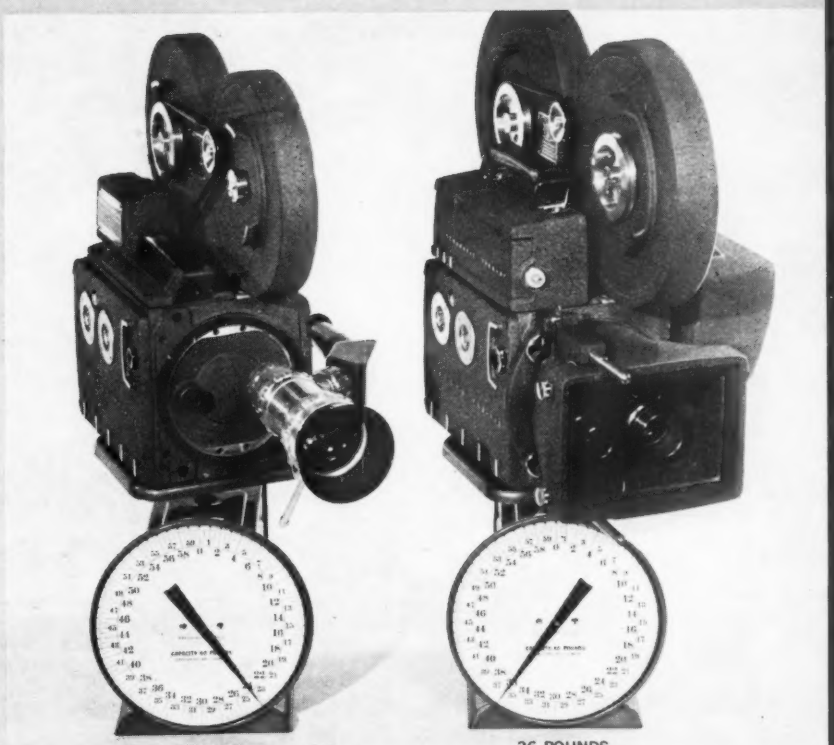

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IND. MOTION PICTURES

(*continued from page* 26)

Moving the camera over a new scene creates an element of surprise or suspense. Through the camera, the audience discovers the unknown. A good example of the effective use of the slow tilt is seen in *Louisiana Story,* a documentary by Robert Flaherty, one of the greatest of film makers. This film tells the story of oil drilling in Louisiana as seen through the eyes of a Cajun boy. This boy has lived in the bayou all his life and the mysterious drilling operations are pure magic. There is one scene where Flaherty introduces the oil derrick for the first time, floating down the bayou on a flat barge. He cuts from the boy's staring eyes, showing awe and fear, to the barge. But we do not see the complete derrick. It is revealed by use of a slow steady tilt, starting at the water line and showing only a small part of the rig. We see it part by part, traveling upward until finally the top can be seen. The audience is as impressed by the height of the derrick as the boy.

Before he moves his camera, the film maker must be aware of special problems which the moving shot will create in editing. Unless there is a definite stop, the moving shot cannot be cut to a still shot. This means that the tilt, pan or dolly must be used in its entirety, for the 20, 30 or 50 seconds it may take. If the editor finds he cannot afford that much time for one shot, or if he finds it breaks up his cutting rhythm, he must discard the whole thing. This is why editors advise, even beg, cameramen to stand still for a long enough time at the beginning or end of each pan. Even if the pan must be eliminated, they can save and use the two still shots.

There is an effective way to use a moving shot without coming to a stop: follow a moving shot in motion with another moving shot going in the same direction and at the same pace. This is one type of montage cutting. The cumulative effect of repeating ideas, images or movements is one of the reasons for the potency of montage. When one movement is cut to another movement of a similar subject, there seems to be a fusion and strengthening of the impression. The montage effect can be achieved by a straight cut but it is much more effective when the moving shots are joined by dissolves. When a moving shot is cut to a shot moving in the opposite direction, the effect is not a

(*continued on page* 69)

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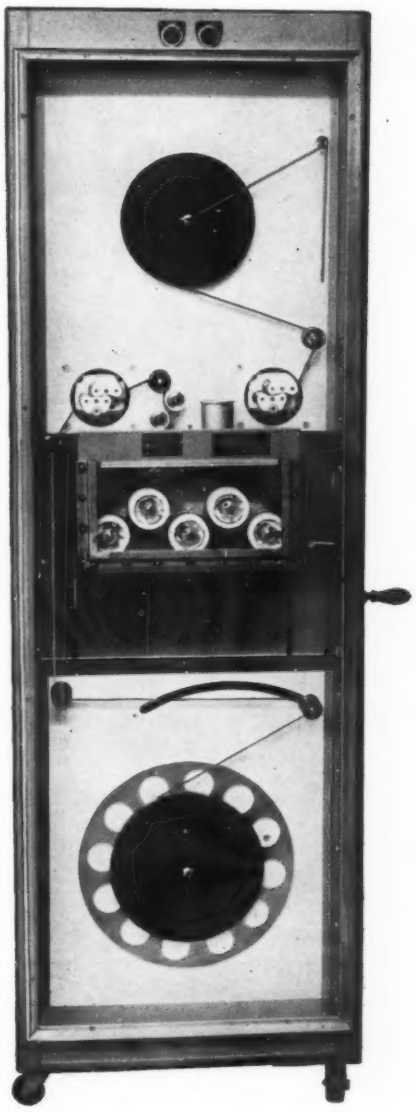

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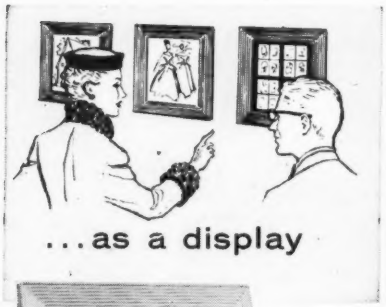

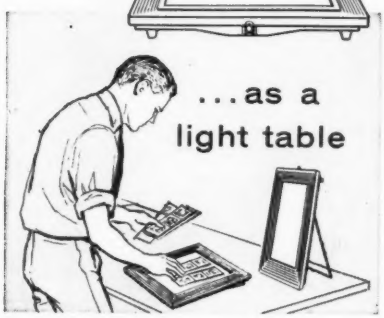

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by Samuel Lang & Leonard Zoref

INDUSTRIAL COLOR

Data and opinion on goosing film speed through forced processing

We continually experiment with "push" processing of color films. Since we're often asked for our opinion on this subject, we'd like to report our current results to you. But before we get into a film-by-film discussion of forced processing for higher film speed, we feel some general comments are in order.

Without exception, we're against overrating color film speed as a standard procedure and then pushing development to compensate. The increased speed is always gained at a sacrifice of other qualities of the film. The price to be paid consists mainly of increased grain and contrast, and decreased latitude. In addition, slight manufacturing variations which go undetected under normal conditions, may be exaggerated by forced processing to the point where they are objectionable or even disastrous. If critical or high-quality work is demanded by the assignment, forced processing of color film is out. Of course, an emergency is something else again. Some marvelous pictures have been made possible by forced processing. If a once-in-a-lifetime shot can be obtained or rescued by pushed development, the end certainly justifies the means.

Another point we'd like to emphasize is that the following data come from our empirical tests. Some individual taste and judgment is involved. It could be that you would come to somewhat different conclusions from the very same evidence. Furthermore, results will vary slightly from emulsion number to emulsion number—and may change with changes in manufacturing technique. So take our findings as guideposts and not as survey monuments.

Ektachrome (process E-2)

At present Ektachrome E-2 is available in roll and 35mm only. There are two emulsions, one for daylight and another, Type F, for exposures with clear flashbulbs. Kodak's rating for the daylight emulsion is ASA 32, but our experience tells us that the 120/620 daylight roll films are best exposed at ASA 24 (a half-stop difference). This does not apply to the 35mm daylight film which is best exposed as rated. The Type F films are rated in terms of flash guide numbers rather than exposure meter indexes.

When pushed, E-2 Ektachrome tends to look magenta. This can be compensated by changing color developer as well as first developer times. A one-stop push usually requires a 5-min. increase in the first developer and a 5-min. decrease in the color developer. Another, and we think better, way around the problem is to shoot with a CC 10 (.1 density green) filter and use the normal time for the color developer. A stop and a half requires a CC 20 filter with an additional 8 min. in the first developer and minus 5 min. in the color developer. We don't recommend pushing further than 1½ stops with this film because beyond this point, the heavy filtration necessary just about cancels out any speed advantage. In addition, contrast rises considerably, grain increases and highlight detail washes out.

When Type F films are used with tungsten lamps, follow manufacturer's recommendations for light balancing filters in addition to the filtration mentioned above.

High-Speed Ektachrome (E-2)

High-Speed Ektachrome is available in daylight and Type B (3200K) varieties. Daylight is rated accurately at ASA 160, the tungsten at ASA 125. These films, unlike the standard speed E-2, do not go magenta in color balance when pushed. The processing to compensate a one-stop underexposure would require plus 5 min. in the first developer and minus 5 min. in the color developer. A two-stop push would be plus 10 min. in the first developer and minus 5 min. in the color de-

veloper. Half-stop time is plus 3 min. in the first developer. The color development should never be decreased under 10 min., as insufficient color coupling will occur, with unhappy results. Occasionally you encounter a High-Speed Ektachrome emulsion that will go slightly greenish when pushed. You can counteract this by returning to the normal color development time or even adding to it. The one-stop push brings the exposure index to 320 daylight and 250 tungsten. A 1½-stop push would provide indexes of 500 and 400 for daylight and tungsten, respectively. A one-stop push does not seem to alter the grain structure excessively, and contrast remains pleasing. A two-stop push produces excessive grain and tends to weaken the blacks. This is about the limit. Any further pushing tends to fog the film and wash out the color.

The Anscochromes

Anscochrome (Daylight, ASA 32; and Tungsten, ASA 25), Super Anscochrome (Daylight, Tungsten, and 6500–all ASA 100) all respond in a similar way to forced processing. The manufacturer's ratings are accurate.

Results with overdevelopment for a one-stop push come within an ace of the quality obtained with standard processing. No filtration is necessary when shooting for a one-stop push.

The maximum these films can be pushed, we feel, is two stops. At this point there is some apparent loss in quality, which may be aggravated by manufacturing variations.

Filter recommendations for the two-stop push have varied from time to time as new emulsions have reached the market. At present we suggest the use of a CC 10B filter for the most desirable color balance with the two-stop processing push. Because of the light loss with the filter, the two-stop increase is set back a quarter of a stop.

Processing times for a one-stop push are 5 min. extra in the first developer, with no change in the color developer. A two-stop push requires a 10 min. increase in the first developer and an 8 min. increase in the color developer.

We'll delve into pushing other films in a future issue.—THE END

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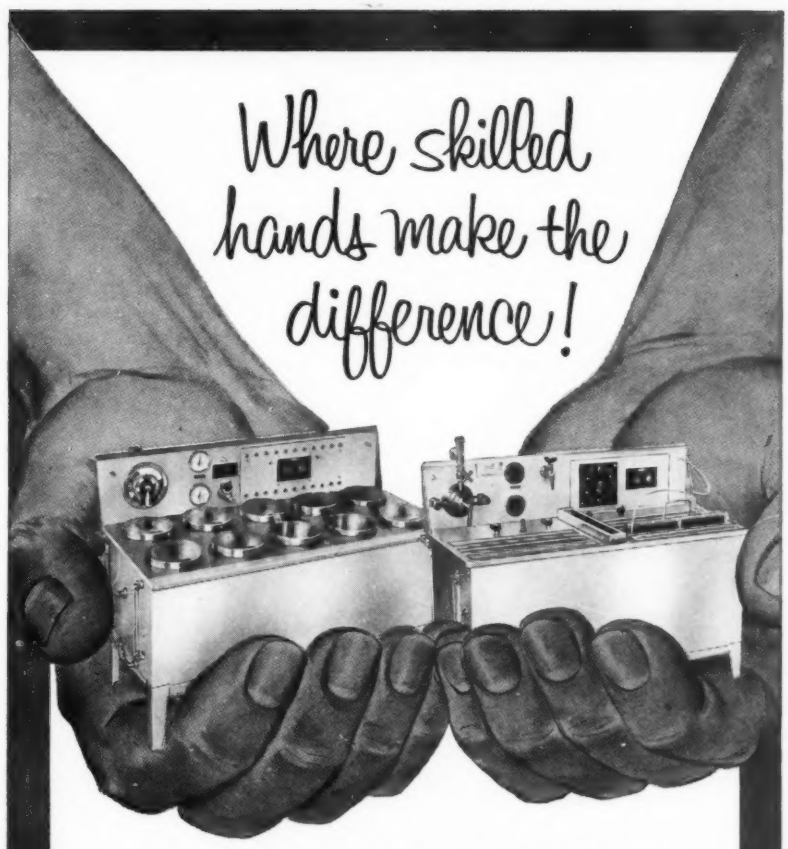

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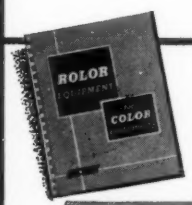

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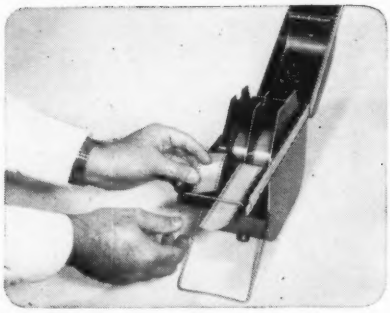

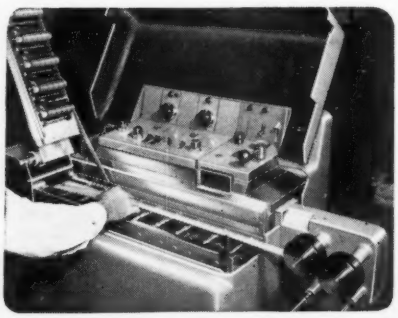

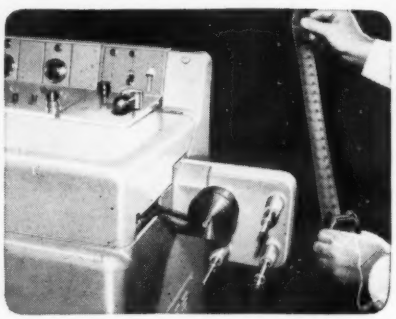

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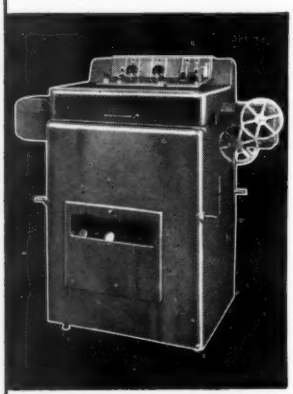

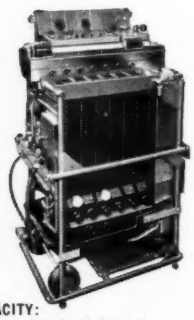

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AN EDITORIAL

LIGHT IN AUGUST

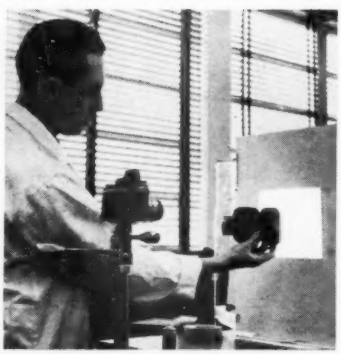
Next month promises to be August in more ways than one for photographers in industry. Two of the most renowned groups in the field will be holding their annual get-togethers. The Society of Photographic Instrumentation Engineers (SPIE) holds its Symposium, sponsored jointly with the United States Air Force, and Exhiborama in the Ambassador Hotel, Los Angeles, August 1-4. The Professional Photographers of America (PPofA) sponsors its 8th Annual National Industrial Photographic Conference in the Conrad Hilton Hotel, Chicago, August 7-12. • This permits photographers who wish to be truly well informed a day to make it from L.A. to Chicago and a day to scout the National Audio-Visual Association (NAVA) Convention at the Morrison Hotel, Chicago, August 6-9. • As a matter of policy, many firms encourage the photographic staff to attend and participate in such conventions as these. There is a profit motive lurking somewhere behind this. The more knowledge a man has in his field, the more valuable and productive he can be in an organization. The rationale from an individual's viewpoint is not far different. The more know-how he can accumulate, the better he can perform. The better his performance, the more rewarding his career is likely to be. On either side, it's a forward looking attitude. One can see the attitude exemplified in the caliber of the men and their organization represented. • Photographers look forward to these meetings because through them they acquire knowledge that applies directly to their careers. Brought together, they are an assemblage of a vast amount of practical information. Formally and informally, a great interchange of information goes on, enriching all. • Besides being better informed, most who attend find themselves refreshed. These meetings are a singular opportunity to unload woes, to compare efforts with persons faced with the same perplexities, and to give birth to ideas which have been pregnant for months. It's a group therapy on a grand order.

The Editors

This industrial giant, one of America's oldest, got along for decades without any industrial photographer. Then science took over. In seven years the photo staff has grown from zero to three and the demand for research photographs increases continually. Here's how three all-around men handle the job

COLGATE-PALMOLIVE CO.

Lyons *(foreground)* and Weilandics in decorator-color darkroom. Neatness counts—and it's not very expensive.

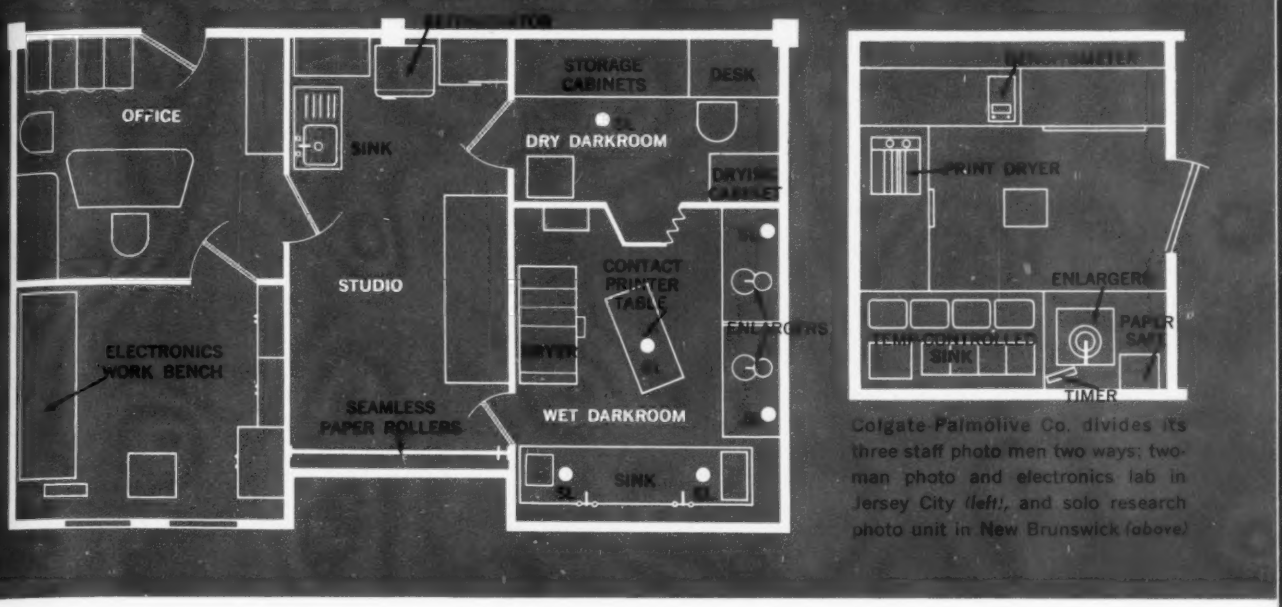


Sanders takes a meter reading for shot of a paper chromatograph.

Scientist checks view in ground glass of bacterial culture.

Contact print table on industrial rollers glides out of way to clear decks for projection printing.

Storage tanks above sink keep photo solutions on tap, avert chemical, physical exhaustion.



Colgate-Palmolive Co. divides its three staff photo men two ways: two-man photo and electronics lab in Jersey City *(left)*, and solo research photo unit in New Brunswick *(above)*

In a harbor noted for its variety and richness of smells, one of the sweeter ones greeting water traffic in New York harbor since the days of sail is the aroma which wafts over the bay from Colgate-Palmolive's plant on the New Jersey side of the Hudson.

While an attar of rose is an attar of rose is an attar, and while housewives still like to think of Monday as washday, the soap business has changed a great deal. Typical of the changes is the Research and Development Department with subdivisions such as an analytical section and the biological research laboratories. This would have baffled any self-respecting captain of industry when Colgate and Palmolive were becoming household words but in today's more scientific climate, a stockholder would feel management lax if it did not devote part of the profit to such efforts.

The research effort at Colgate-Palmolive is prodigious these days. And it turns out that the microbe hunters and ester isolaters need a ready means of recording their quarry once bagged. Enter photography.

Seven years ago, R&D bought all its pictures on the outside, then took on a staff man. Four years ago another was added. Last year a third man was put on. These three are so busy that it looks like a fourth will be needed soon. One advantage of an inside source of pictures for R&D's assignments is that many of the projects are long term affairs and it is hardly worthwhile attempting to break in an outside supplier each time a picture is needed. For example, one of the current R&D long range projects has been recorded with close-up and macro stereo color shots. Specialized equipment (a rack-over device coupled with a 35mm camera) and experience is needed for this. An inside man can train himself to handle the photographic technicalities to perfection, and after a few trials has clearly in mind what the researchers want. In all it will take about six months. Such an arrangement with an outside photographer would likely be unprofitable for him – while from R&D's standpoint, the staff arrangement assures the company of a steady source of consistently adequate photographs at a predictable cost, reduces training time to a minimum and guarantees commercial secrecy, a factor in much of the R&D work.

It would be impossible to put a price tag on such values as these, but obviously R&D keeps them in mind when approving photo budgets and payrolls. Evidence of the importance of photographers to research efforts is found in the new Colgate Biological Research Laboratories in New Brunswick, N. J. –about 30 miles from the research headquarters in Jersey City. A photo unit was planned along with chemistry labs, test animal rooms, examination rooms and offices.

Boss man of three photographers is a rotund baritone, Joe Lyons. He came to Colgate from an industrial photo post at American Optical, where he doubled in brass as an electronic technician. The electronics training is coming in handy for Lyons–and Colgate–currently while the company is installing conference and training rooms equipped with up to date A-V apparatus.

Joe Weilandics works with Lyons in the Jersey City photo installation. He shifted from drafting to photo within the company when the opportunity presented itself. Weilandics, besides his still and motion picture work, handles art and lettering for slides, the favorite A-V device of Colgate's scientists and technical men.

Stationed in New Brunswick is the newest member of the staff,

COLGATE-PALMOLIVE (*continued*)

John Sanders, who was a news photographer with Fairchild Publications, a trade newspaper house in New York. He reports to Lyons, but his standing orders are to accept assignments from any senior staff member of the Biological Research Laboratory.

Currently the staff is shooting about 1,200 sheets of 4 x 5 black-and-white film monthly, and lesser numbers of 4 x 5 color transparencies and color negatives, 3¼ x 4 lantern slide plates, black-and-white roll film and 35mm color for slides. Motion picture footage is an occasional matter.

The camera arsenal consists of three Linhof IVs, a Graphic View II, a Hasselblad 500C, a Nikon S-2, a Stereo Realist, a Praktina for photomicrography, a Beseler Topcon with Makrokillar lenses for photomacrography, a Kodak Cine Special, a Bell & Howell 70DR and a Crown Graphic.

This last camera was purchased for a special job in the Biological Research Lab. A room there is set aside for studies of human sweat. That sounds unpleasant enough, but the room there is kept at a temperature of 98° F while the relative humidity hovers between 90 and 95. Photographer Sanders has gradually become convinced that it's all in the interest of health and good grooming and remains chipper as a Turk even after a week's work in the hot box. The Graphic has not come unglued and pictures are fine, but it takes a bit of doing. Sanders heats up the lens and ground glass with a bunsen flame before each shot, and keeps awake with frequent infusions of tea. When the going gets rough. Weilandics comes down to help with the work.

Other of Sanders' jobs include color shots of paper chromatographs, color and black-and-white work through the microscope, record work of experiments and experimental set-ups, report photographs and illustrations for scientific papers and lectures.

Paper chromatography is a method for analyzing minute quantities of closely related chemicals, particularly useful in biological work. As Webster's has it, it consists of "allowing a solution of (the chemicals) to seep through an absorbent so that the different compounds become absorbed in separate color layers comprising a chromatogram."

Sanders in his efficient one-man darkroom. Print trays and developer tanks are all in tempered waterbath sink kept at 70°F with mixing valve.

Electronics repair shop is part of Jersey City photo department. Lyons checks sound system of 16mm projector maintained by photo.

Lab posts fit in holes drilled in studio table, hold lights, gobos. Table top lifts to reveal light box. Lyons adjusts light, Weilandics is at Linhof.

The tests are most indicative for only a brief period after their preparation. Thereafter they gradually fade until nothing is left of them. Colored slides are an inexpensive and relatively permanent means of recording them for posterity, or at least until the research project is completed. Sanders has it down to a system, so he can shoot the transilluminated chromatograms while they are hot out of the oven in short order, and then dash back into the dark room to expose more prints.

Back in Jersey City, the bulk of the staff work consists of record photographs of the long range research projects and record photographs. Furthermore, a number of assignments are done for other sections of the company. A typical example was one for the International Division. A series of color photographs were made to show variations in the green of Palmolive shaving cream as produced in domestic and foreign plants. The variations result from differences in local raw material and consumer preferences. Color prints put the idea in permanent form for communication with plant managers throughout the world. Other departments calling on the services of the photo staff are Engineering, Patent, Public Relations, Legal and the Production Departments.

The photographers handle their own black-and-white processing. All color work is sent out but the volume of color prints is approaching the point where Lyons feels it will be more economical to handle Ektacolor paper in-plant.

The research photographers use no special techniques in the darkroom, but rely on time-tested formulary, time and temperature development, graded papers and practiced eyes. Although the darkrooms are small, the photographers avoid production bottlenecks with mechanized washers, belt-fed drum dryers for paper and a drying cabinet for films. One thing that keeps the Jersey City labs shipshape is plentiful storage space in enameled metal kitchen cabinets with magnetic locks. Although one almost expects Betty Furness to pop out of the decorator-color darkroom, the fixtures were chosen because they were the most economical way of enclosing the storage space required. They are a nicety but hardly a frill.—THE END

MEMO ON: LEASING, OR, WHY BUY A COW?

There is an old saying, credited, as are so many old sayings, to the French which asks "Why buy a cow when milk is so cheap?" While it is more than likely that the remark refers to a more personal relationship, it describes the philosophy behind leasing perfectly, the phenomenal growth of which reflects the ever-increasing cost of cows over the past decade.

Leasing is nothing new; the railroads have used a form of leasing (equipment trust) for years to supply new cars. Automobile and truck leasing has also been common. The interesting factor in the increased leasing has been the extension of this arrangement to practically anything anyone might find useful for business purposes, from a completely-equipped supermarket down to an adding machine. Not the least in the array of leased items is photo equipment.

Leased photographic equipment is largely concentrated in the processing and motion picture fields, both of which involve fairly high capital expenses. A color processing unit, installed, may run well over $5000. Movie equipment, including cameras, sound gear, lights and assorted sundries, is equally expensive. According to American Industrial Leasing Company, about 20 per cent of the business written by their New York office covers photo equipment, principally in equipment for the areas above.

What advantages does leasing offer? For many smaller firms, leasing permits them to get new capital equipment and still maintain their working capital position. Smaller firms are traditionally under-capitalized so that without a leasing arrangement, they would either have to forego buying new equipment or else use money that is needed elsewhere. Unlike a loan, leasing does not show up on a balance sheet so that their financial position (which governs their credit rating) remains unimpaired.

For operating divisions within large corporations, such as photo sections, leasing offers a method for getting new equipment without exceeding the corporate budget. Quite often, management will not approve a heavy purchase but they will permit a leasing arrangement as being easier to handle within the section's budget.

Generally, the lease is written over a three- to five-year period with an annual cost about equal to the selling price plus interest and insurance during this period. At the end of this period, however, title to the equipment remains with the leasing company. Generally, the equipment can either be bought for a mutually-agreed price or can be leased further for a nominal annual (usually 1 per cent of invoice cost) rate which can be done indefinitely.

However, most leasing companies suggest that customers check with legal counsel if they intend to purchase equipment at the end of the leasing period. If the lease carries a purchase clause, it could be interpreted as a conditional sales contract (such as are used in installment buying). This would nullify some of the tax advantages which could accrue from leasing. The major advantage as far as taxes go is that the lease is considered expense to be deducted from income. However, this advantage depends upon the financial condition of the firm, the equipment involved and tax rulings which may be in force.

While leasing is more expensive than bank credit, it often is simpler and less bound by restrictions. Also, it does not involve any impairment of credit rating so that future loans may be obtained along with the new, leased equipment. The representative of a major leasing company reported that in determining the value of leasing versus other types of equipment financing for a potential client, he compares the net return on working capital with the cost of the lease. For example, if a firm realizes 18 per cent on working capital (about average, according to financial services), a lease that costs 10 per cent would be advantageous. On the other hand, if their return is only 6 per cent, it might be cheaper to use another method.

From the viewpoint of the vendor, leasing has proved valuable in maintaining sales. Very often, a firm supplying photo processing equipment will be on the verge of getting an order . . . except. The exception may be a budget problem or vacillation on the part of top management or perhaps a fear of obsolescence. By offering a leasing arrangement, a vendor can make the sale and the photo section chief can have his new equipment without having to explain a heavy outlay just when his company has fired six vice-presidents in a retrench-

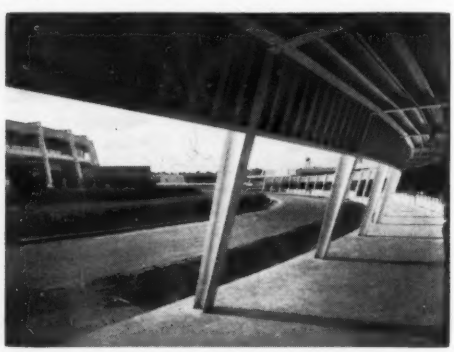
Leasing is a very attractive way of doing business but like with all very attractive things, there is the element of cost. Also, there have been objections to leasing arrangements by various people in the photographic industry, based, primarily, on the cost involved in a lease arrangement. Just how much does the customer pay for the convenience of a lease?

(*continued next month*)

CONSTRUCTION CHEESECAKE

To Jules Shulman, the secret of successful architectural photography is in making a building not look like a building, but in glamorizing it. By using wide-angle lenses, he can make even a one story garage look like a skyscraper designed by Frank Lloyd Wright. Report by Lou Jacobs, Jr.

Circular stairway at Convair Astronautics. The couple were included to add scale to the picture.



The sweep of this passage way was captured with the 75mm lens, a view the human eye cannot cover.

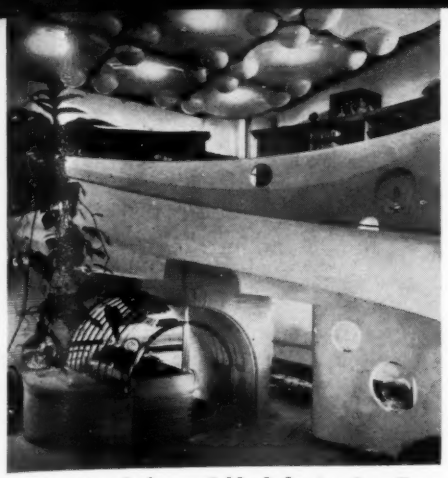
Echoing the forsaken lover, the in-plant photographer is apt to ask in a small plaintive voice, "What has he got that I haven't got?" when management brings in an outside photo specialist to take some pictures.

Quite often, the answer is as subjective in the case of the cameraman as in the case of the lover. Maybe the new man is just a better salesman. Maybe it is just a search for something new. Or maybe the new man is one of a small class of photographic specialists who can do a certain type of picture better than most of the photographers around. Typical of this latter class is Jules Shulman, architectural photographer and specialist in glamorizing buildings.

Too many times, when management asks the plant photo section for a picture of the newest ultra-modern, ultra-efficient administration building, they get back a shot of a building which says, "this is how it looks," period. This is not how it looks to management, however. It represents a sizeable chunk of stockholder money, has every possible convenience and was designed by one of the leading architects in the shape of a waste basket. This is the latest, greatest building in the industry and that is what management wants to see in pictures of the building. This is what Shulman's pictures tell them, unmistakably, graphically.

"The tendency of the average photographer is to shoot with longer lenses, rendering a building as it appears from a distance and conveying a feeling of simple, rectangular mass. When I peer into the ground glass of my 4 x 5 view camera, I am usually looking through a wide-angle lens, no matter how far away the topography would allow me to set up. Here," continues Shulman, "is the crux of the matter. The wide-angle makes a building loom up and out. It creates an impression of height and tremendous length, a new and dramatic perspective."

Photographers who avoid the wide-angle effect, perhaps because they are worried about exaggerated perspective, are missing the most effective tool the architectural photographer has, according to Shulman. He feels that a



Combination flash, available light for San Francisco shop designed by Frank Lloyd Wright.

For extremely dramatic effects, infra-red film was used to photograph this Convair laboratory.

Careful use of shadows and details, plus Shulman's taste and experience, produced this fine picture.

Night can heighten drama as in this photo of El Cerrito, Calif., high school made with 75mm lens.

photographer must choose between the humdrum catalog approach and the view with impact which startles the boss. "Management does not want to see flat-looking buildings with one plane on top of another, like a set of children's playing blocks."

The injunction against a too-literal recording applies both to indoor and outdoor work. "The inexperienced photographer won't realize that an interior can be composed to suit the photographer. A blank floor in the foreground should be filled with objects or people, which should fit into the scene. Shifting the camera a few feet often will prevent lines from converging in a corner.

"Details are very important in photographing a building, yet some photographers don't know how to use them. I recall a spiral ramp at Convair Astronautics which presented a wonderful abstract pattern. It was exciting. Related to the area around it, it served to accent parts of the scene."

Among the details which concern Shulman on a job are venetian blinds set uniformly, parking lots cleared of cars and general cleanliness and good housekeeping. Before making pictures, he inspects the area with a superintendent and lists things he wants done in the way of housekeeping . . . cartons removed, floor cleaned, etc. He shoots according to a pre-arranged schedule taking care to tie up production as little as possible. Shulman finds that on long production lines, movement won't show up too much even with exposures of 1/5 or ½ sec.

Although much of his work is with available light, of which there is plenty in modern plants, Shulman uses flashbulbs to augment the light. "Stay away from flat lighting, either artificial light or daylight. Choose the type of exterior lighting which gives both modeling and beauty to the structure. Both form and texture are important. A building is a giant piece of sculpture with a personality derived from its form and function. Avoid very early or very late light which casts long shadows. By using shadow and crosslighting, you can get the feeling of depth and dimension. Every building throws shadows which should be made part of the scene. Crosslighting adds sparkle and brings out surface textures."

Shulman's standard lens is the 90mm Super Angulon used on a 4 x 5 Sinar. He also uses a 75mm Zeiss Biogon f/4.5. Although he feels that the photographer who hasn't discovered the unusual perspective and great depth of field of extreme wide-angle lenses is missing a unique experience, a photographer should master the 90mm before trying anything shorter.

Wide-angle lenses are used for interior shots too, creating what Shulman calls "controlled accentuation." He warns that "the tremendous perspective producing effect of wide-angle lenses demands sensitive handling. Don't make a small test room look like a grand ballroom and don't allow small foreground objects to dwarf the rest of the room." When shooting interiors, overall shots are made first, then medium shots to show the function of each section of the room. If possible, include people to add scale but make sure they are subordinated (*continued on page* 91)

BC FLASH BOX

This fistful of standard electronic parts is a power pack for flashbulbs. Despite its diminutive size and light weight, it furnishes enough power to light up a ballpark, bleachers included. It also checks your circuit and conserves batteries. Here's how to make it

This is finished unit. Numbers indicate bulbs used in circuit and settings for potentiometer (knob) to equalize resistance.

Milton J. Schwartz, specialist in king-sized electronic flash equipment (he builds those skylight units much in demand by fashion and commercial photographers for bringing outdoors into the studio) has designed a handy little BC unit, presumably as a change from the big stuff. Available either as a do-it-yourself deal (cheap) or direct from Schwartz all set to use (not so cheap), it provides the advantages of BC flash in one small package packing a powerful punch.

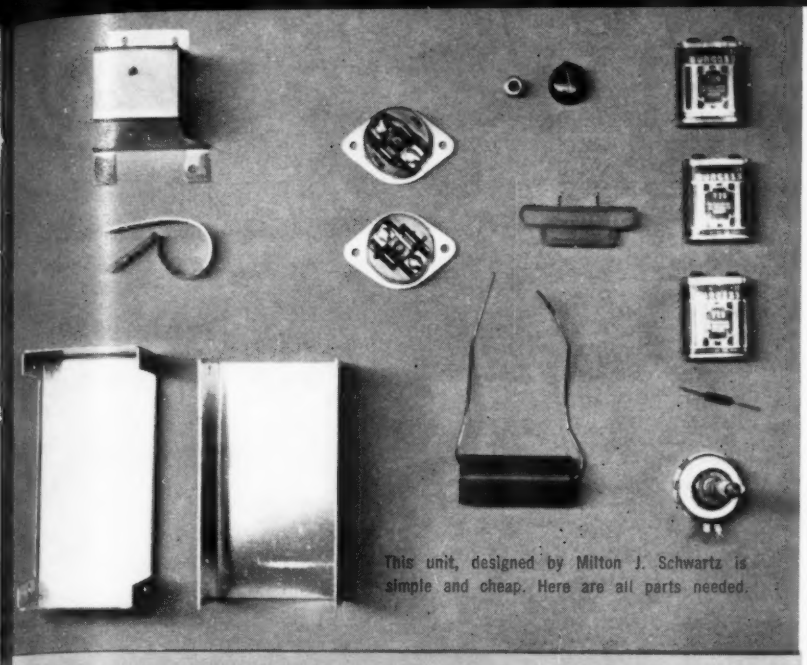
In BC flash, instead of firing directly from your battery, you use a battery (B) to charge a capacitor (C). The capacitor stores this charge until the unit is flashed. Then it lets go with a Sunday punch (electronically speaking, of course). When the capacitor is discharged, the battery charges it up again for the next time you need it. This charging is the only function of the battery so that battery age and condition are not as important as when using solenoids. Current drain is reduced from amperes to milliamperes (1/1000 ampere). Smaller, lighter units can be used.

Because of the surge of current from the capacitor, peaking time of flashbulbs is more consistent. And because the current flows for only one or two milliseconds, switch contact pitting is reduced. This pitting results when the contacts are open while current is flowing, resulting in an arc being drawn across the two contacts. Schwartz's unit has a potentiometer built in (variable resistance) to practically eliminate arcing.

The unit has several advantages which make it attractive to the industrial cameraman who usually goes about with a permanent list to port from an overloaded gadget bag. It is light and compact, measuring about 2¼ x 2¼ x 4 in. It will fire from one to ten bulbs with equal efficiency. An indicator shows whether or not there is sufficient power to fire the bulbs or if the circuit is broken by faulty connections or a bad bulb. There is practically no limit to the length of wire which can be used. The battery has a shelf life of a year or more. The design of the unit and the BC system prevents shutter pitting and bulbs are fired in perfect sync with M contacts. It can be used with a solenoid if the coil is re-sync'd for the BC unit. Finally, it is cheap, the parts coming to about $18.76, with a simple circuit that can be assembled by any reasonably handy cameraman or amateur electronics types.

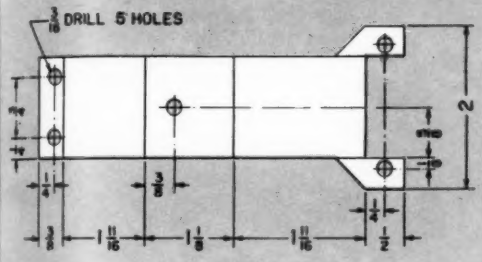
The disadvantages are two—comparatively minor ones at that. The first is that bulb sizes must not be intermixed; if you start with No. 5's on the line, all bulbs must be No. 5. This is to insure even power distribution over the series circuit. The series circuit is the second disadvantage; all extensions must be in series. This permits the use of the indicator light to show the condition of the circuit. The indicator light is on when the voltage is from 90 to 75. Below 75, the light does not

(*continued on page* 89)

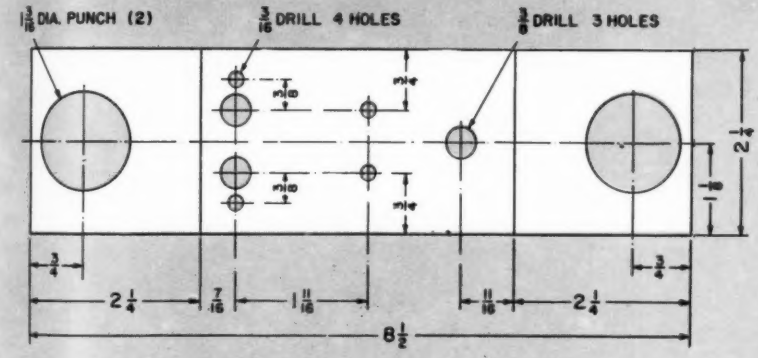


This unit, designed by Milton J. Schwartz is simple and cheap. Here are all parts needed.

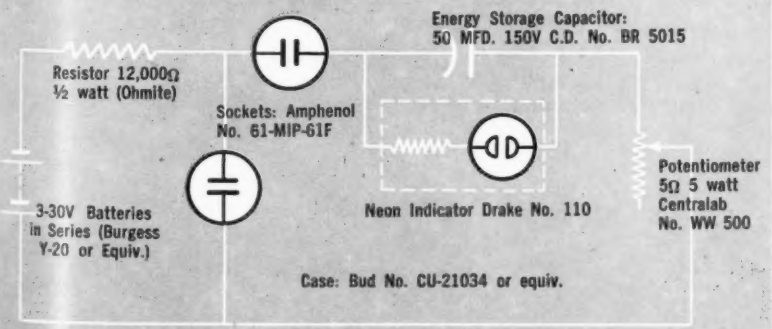
Patterns for battery bracket (top) and unit chassis



Chassis specifications, schematic of unit. Dimensions are exact size for full-size template to use as pattern. Top pattern is for battery bracket. Lower pattern is for chassis itself. Electrical components are listed next to location on schematic diagram. The circuit is quite simple to wire. Parts cost is about $18 to $20.

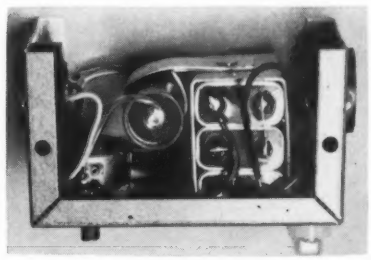


Schematic of BC circuit showing specifications of required parts

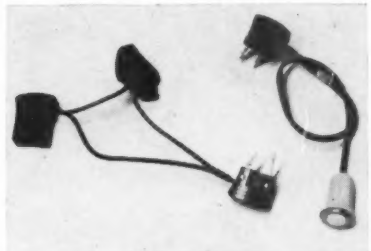


First step: full-size paper template shows location of required openings.

Capacitor is mounted on bracket next to battery holder. Rating is 50 MFD.



Assembled chassis. Three 30-volt batteries in series provide power.



Sockets. When solenoid is plugged in, unit allows remote camera control.

Meter Shop

PORTFOLIO NO.24

Familiarity does not always breed contempt; quite often, its offspring is indifference. Charles Taylor, the photographing editor of the *Ranger*, employee magazine at the Rockdale, Texas, plant of Aluminum Company of America, decided to change this feeling with a series of exciting photos which take a new look at the old place

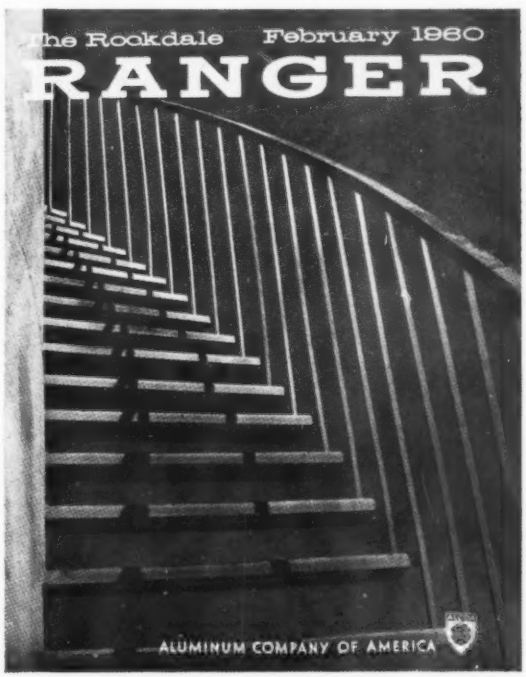
The "big picture," one of the more durable cliches attributed to the Madison Avenue set, is something that is harder and harder to come by in modern industry. The bigger the firm, the smaller the picture each employee has of his particular role. There are two ways of getting this picture, of seeing the company as something more than a printed name on a paycheck. One way is to be president or chairman of the board. This is difficult; vacancies are few and requirements rather high. The other way is through a good house organ which can present the company to its people, to make them aware of what the company is and what it does.

One of the better jobs of "big picture" giving to come along is this series of photographs from the February, 1960 Rockdale *Ranger*, published by the Aluminum Company of America at its Rockdale, Texas, plant. These pictures are part of a photo essay on the plant and its people done by Charles Taylor, editor of the magazine. He decided that the best way to get the people to take a new look at their plant would be to portray usual scenes in unusual ways. The *Ranger* is a small, low-budget, non-slick publication, yet this was not used as an excuse for lazy, uncreative work. Talent does not really require a budget; it needs the will to use it. Taylor had the will.

In his wanderings around the plant area, Taylor kept looking for picture possibilities, trying to find areas of visual interest. These pictures are the result.

All of them were made with a Rolleiflex and an f/2.8 Tessar lens. This camera is used for most of Taylor's magazine work although he also uses a Nikon for color and a Graphic View for his double role as plant photographer. Tri-X and Plus-X Pan were used, developed in D-76 according to Kodak recommendations. Prints were on Kodabromide, developed in Dektol 1:1. An Omega D2 enlarger was used.

Between his editing, house organ photography and plant photography, Taylor is a fairly busy individual. His background is journalistic, rather than photographic: he has a degree in journalism from the University of



Texas and worked for the Austin *American* before joining Alcoa. He credits a long-time interest in photography with giving him enough camera skill to handle his varied assignments.

In these pictures, the reader can see the plant as Taylor saw it, with a unique beauty, the beauty of power and precision, requiring many talents to keep operating. Highly skilled instrument-makers in the Meter Shop keep the assorted gauges and meters operating, telling all concerned with managing the plant what goes where and how fast it gets there.

The cover shot shows the ladder of a silo-like storage building for aluminum ore which is processed at the plant.

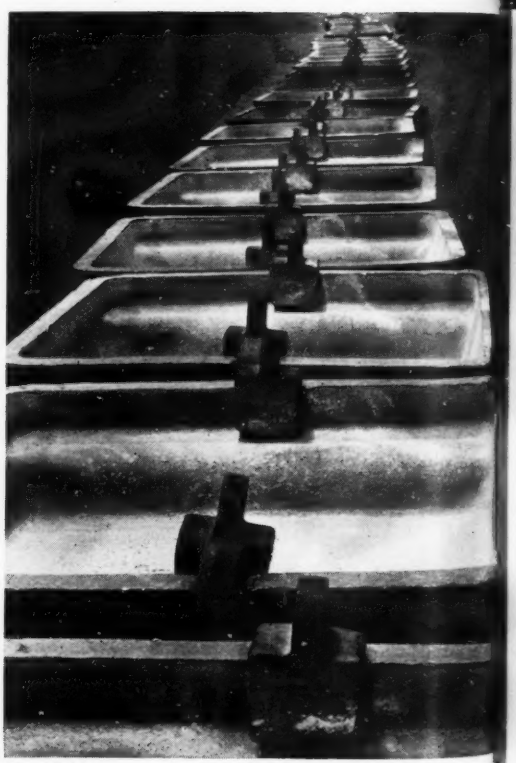
The silhouette was made at the Quality Control Lab. Taylor was interested in the appearance of one liquid poured into another and made the picture.

Control Panel was made in the meter shop to portray the many controls found in a modern plant to epitomize automation.

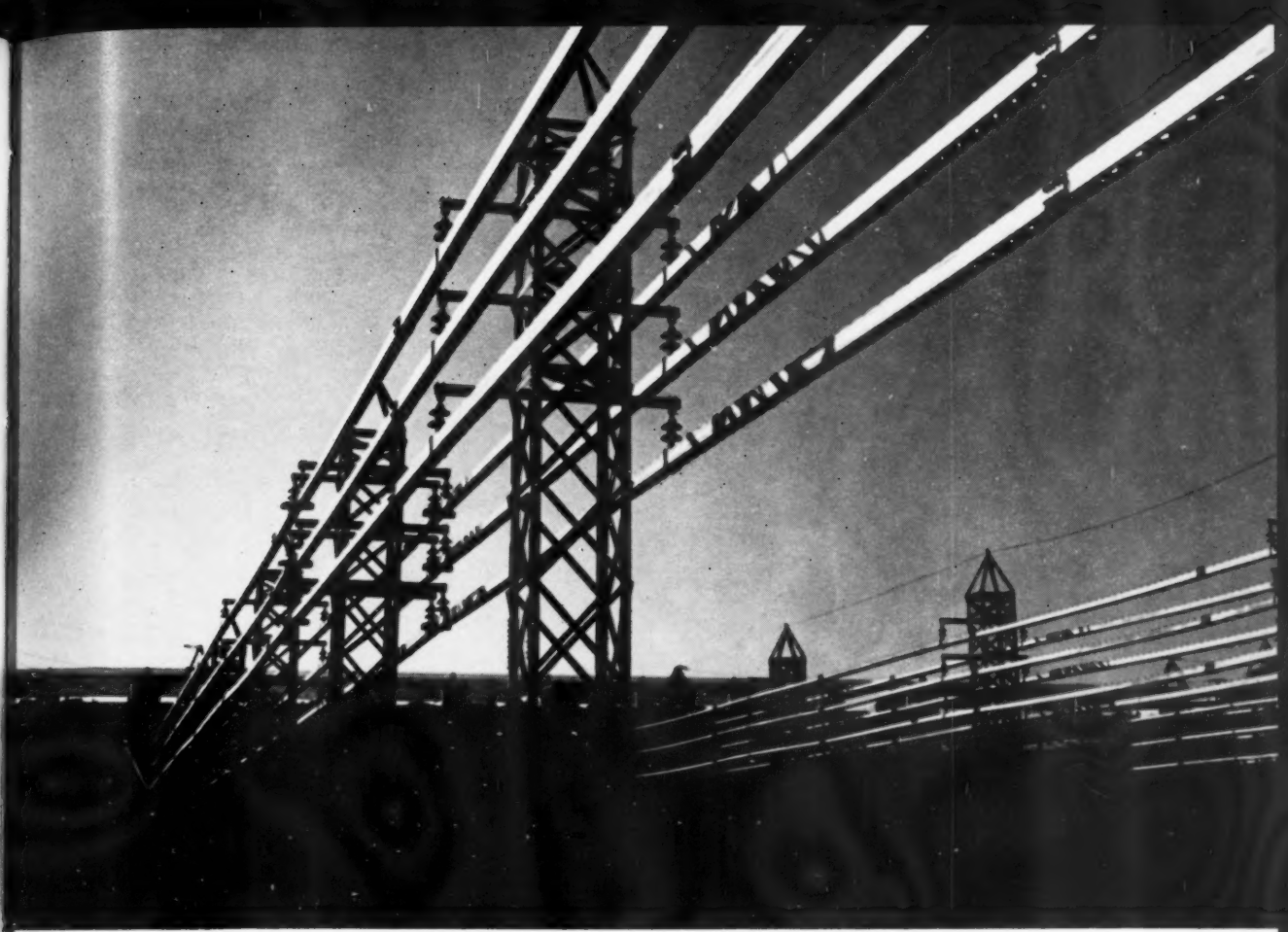
Pig Molds was a night shot and shows the

Control Panel

Laboratory



Pig Molds



Power Lines

Extrusion, End View

molds into which aluminum is poured to get ingots, or in trade terms, pigs (as with pig iron). Each one holds 700 lbs. and is lined up, awaiting the next day's production.

Electricity and aluminum are virtually inseparable. Here are some of the lines which supply the Rockdale plant with power.

Finally, there is the product, aluminum extrusions as seen from the end.

Each of these pictures shows a scene so familiar that a less perceptive photographer or one who lacked a point of view would just pass them by. He would continue to supply the same old smile pictures (chairman of the board, smiling; retiring foreman, smiling; prettiest file clerk, smiling; etc.) for the plant magazine. While your plant publication may not be as glamorous as *Life* or *Look*, it is nevertheless an important part of American journalism and growing even more important. It will be interesting to see if the average plant cameraman can match this growth. In the case of Charles Taylor, growth is evident.

EASY WAY TO A-V OVERLAYS

One of the problems faced by the photo department at the Meredith Publishing Company (publishers of *Better Homes and Gardens* and other magazines) was a need for a method by which we could overprint a colored background with type, or combine type and art work, to produce filmstrips and slides. These slides, using letters of one color against a background of another color, could be made by several other methods such as hand lettering. However, by using photography, we can do the job cheaper and faster. The system we use involves making a double exposure on color film, copying the art material which has been placed in a 4 x 5 Vu-Graph mount, punched for accurate registration.

The process begins when the art department brings us the materials supplied by the "customer" (in our case, the advertising or general promotion departments). The layout and materials are already correlated. The layout is prepared to fit a 2 x 3-in. format.

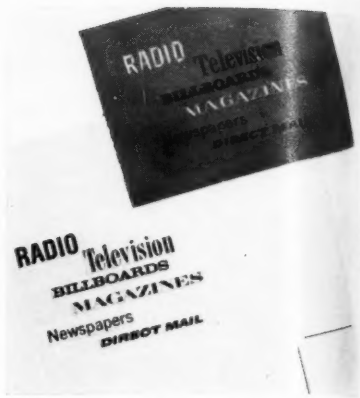
In the case described here, the assignment called for black-and-white (reverse) lettering on the same slide against a red background. The offset department furnished a line negative of the white copy and a positive of the black copy.

The copy and the mask, all mounted in punched mounts for accurate registration, are copied on a Leica Reprovit attachment using a Leica camera. The method of making double exposures varies with the model Leica involved. On ours, a IIIf, we make one exposure normally, then make the second exposure by winding the shutter using the high-speed dial.

We use a specially-made light box containing both fluorescent light and a 50-watt-second electronic flash unit which is used for the actual exposure. Rough, textured aluminum in the shape of a parabolic reflector inside the box gives us even illumination. Exposures, on Anscochrome Daylight (exposure index 32) is f/5.6 for the first exposure and f/9 for the second (white) exposure.

The exposures are made after we place the positive and the red acetate on the register pins on the light box. This gives us red background and black type. Removing this, we now place the second negative in position and make our exposure.

The captions under the pictures give the details for one particular job which we did. The main problems are registration and exposure. It is recommended that several trials be made.

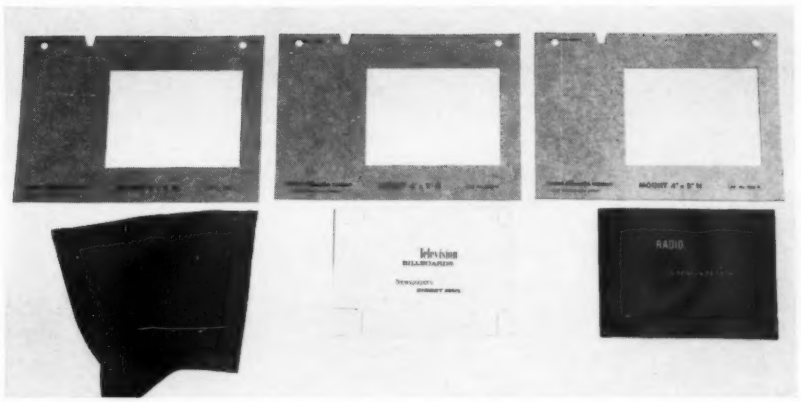


Prepared layout in 2 x 3 proportion is received from art department. Here is request for black-and-white (reverse) lettering on red background.

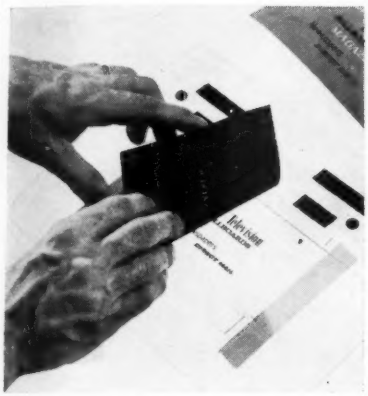
Guide sheet of .007-in. clear acetate is used to align register marks on film by scribing identical lines. Positive is taped in place temporarily.

Acetate with register pins is taped to light box made at Meredith for use with Leitz Reprovit unit, used for the copying process. Anscochrome film is used.

Vu-Graph mounts are punched to insure correct registration of type and background overlays. For this job, three mounts will be needed.

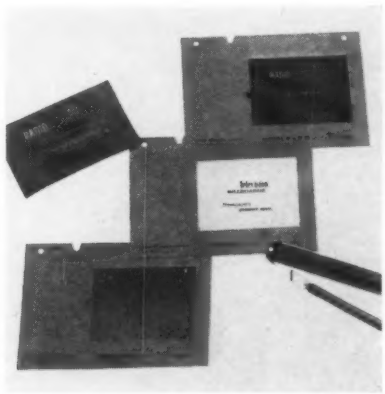


All components needed are assembled on light table ready for use. These include three 4 x 5 Vu-Graph mounts, a red acetate sheet, a film positive for the black lettering and a film negative for the white lettering. Light table contains a fluorescent light for viewing, electronic flash for photographing.

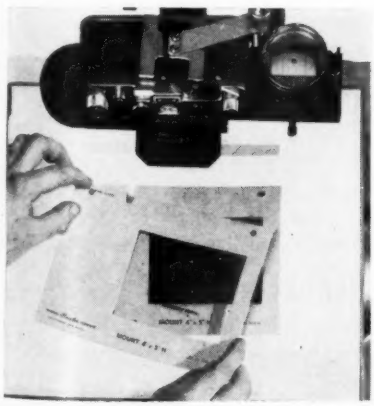


For perfect registration, both negative and positive are superimposed over scribed corner marks and taped in the correct position.

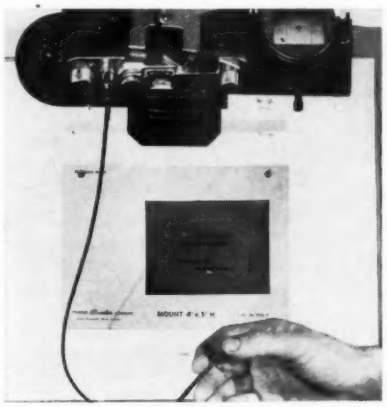
Pre-punched mount placed in position over register pins, taped to negative and combination removed. This step is repeated for red, positive sheets.



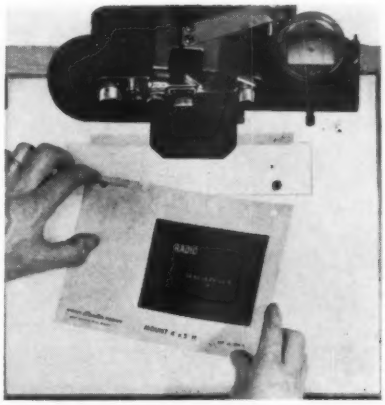
Three components, all assembled, include positive, negative and red acetate background, all in mounts in register with each other.



Positive, red background, mounts are placed on register pins for photographing. Rough textured aluminum in box gives even light.



Combination red acetate and positive gives black on red. First exposure is made using electronic flash unit (50-watt-seconds) at f/5.6.



Second exposure at f/9 is made of mounted negative. A double exposure (film is not advanced) burns out color to give reversal (white) letters.

WORLD'S MOST VERSATILE POCKET TAPE RECORDER

pennebaker
film productions
27 EAST 95TH STREET NEW YORK CITY
January 15th, 1960
Mr. Allen Bryson
c/o Mohawk Business Machine Company
38 East 57th Street
New York, New York
Dear Mr. Bryson:
We are interested in making the Documentary film a more vivid and exciting presentation of places and events. This requires the Filmaker to become more involved in a situation than is required for most filmaking.
In other words, he must be prepared to live with his subject, whether it be locomotives or Eskimos. However, it is equally important that he not be burdened with complicated and heavy equipment. He must be able to record the sound as well as the picture of an event without himself altering it.
I have recently made two films which in many ways were extreme cases of this kind of filmaking. One was a film, one hour in length, on Russia, shot in areas not usually ventured into by photographers. In recording sounds for this film, I used a Midgetape 500 tape recorder. Because of its small size and concealability, I was able to get material otherwise unobtainable.
More recently, I made a film for Life Magazine involving a Balloon flight into the stratosphere. Two men on a rather extraordinary scientific mission, used a Midgetape almost constantly for the forty hours they were in flight, to record their observations and feelings.
Again, the size and adaptability of this recorder, plus the ease with which its magazines could be loaded or unloaded, made possible the recording of one of the most exciting parts of the adventure.
I feel strongly that this machine or adaptations of it will make possible even more exciting coverage of places and events to come.
Sincerely,
D. A. Pennebaker

FEATURES

- Exclusive VU METER for distortion control
- TAPE SPEED: 3¾" per second
- WOW & FLUTTER: 0.3%
- FREQUENCY RESPONSE: 50—10,000; ± 3 db range 100—8000
- OUTPUTS: 2—One 10mw at 2,000 ohms; Two Zero VU at 600 ohms
- Requires NO ELECTRICITY
- Operates on a SINGLE battery
- Completely TRANSISTORIZED
- Weighs ONLY 3 lbs
- Automatic cartridge-loaded tape
- All recordings can be MONITORED
- Optional accessories for every conceivable use

MOHAWK midgetape PROFESSIONAL 500 World's First Broadcast Quality Pocket Tape Recorder

A Palm-size Engineering Masterpiece that instantly captures and records any conversation, music or other sound and plays it right back in rich, professional Hi-Fidelity quality so fine that NBC and CBS use it for in-the-field recording. Business executives use it for inventory-taking, conferences, making technical and promotional sound movies, etc. Midgetape's uses are endless.

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Get more information. Circle 459, page 85

Song and dance acts, slides, speeches, an arsenal of theatrical pro-

jection equipment, photography of every sort—add up to spectacular . . .

INTEGRATED A-V

In the middle of the president's speech, five lovelies prance out onto the stage carrying cheerleaders' signs. As the company's economist comes to a crucial point about the gross national product a scrim lowers on the huge stage and a rear projection arc unit flashed his message before the audience. The sales manager says, "Let's consider the average consumer," and lo, the houselights dim while Mr. and Mrs. Average Consumer act out their parts in a full color sound motion picture.

The annual sales conventions of the Armstrong Cork Co., in Lancaster, Pa., have been saluted by the trade press as outstanding presentations in industry. They deal in the unexpected; at almost any moment the audience may be hit up with choruses from Broadway songs, skits, motion pictures, front and rear projection slides, placards, or song and dance routines. The audience, wholesalers of Armstrong products, love it. Their attendance is almost perfect year after year. And they get the message. Armstrong's competitive position gets stronger all the while.

The A-V devices employed are gimmicks only in the sense that they are valuable bits of showmanship to keep attention at a high pitch. Their function is to dramatize the points Armstrong wants to communicate with the men responsible for marketing its wares.

In the Armstrong sales convention, A-V communication is functional as in few other places. A two-day show may comprise the equivalent of a couple of motion pictures and 450 slides, but each foot of movie and each slide is used where it will count the most. The visual material for a lecture might be just one slide, or a couple of minutes of film. It is not necessarily complete in itself; it might come at the beginning, middle or end of a presentation—it all depends on the speaker, the subject and the other elements of the program.

Armstrong's highly successful *integrated* approach to audio-visual techniques in sales conventions is a by-product of the policy of maintaining a highly-skilled staff of talent for sales promotion activity.

Why does Armstrong prefer an inside organization to handle this work and can the overhead of additional people and equipment be justified?

Principally, the high degree of diversification

of the company precludes the possibility of an outside organization doing as effective an over-all job as persons intimately associated with the business. Armstrong manufactures some 350 products in the lines of building materials and flooring, packaging and industrial specialties. To learn this business intimately is a large order even for a person directly associated with the company. It would be a tremendous job to have to translate the company's aims and operations to an outside group each time the company has a project. There are too many divisions and too many projects.

Also, it is felt that actual employees of the company would be able to control the projects more effectively and do a better job. Ideas used for one division for conventions or other projects are often applicable for another division with a few variations. Then, too, ideas tend to snowball from close association with the subject.

Intimate knowledge of the problems and people help make the skits used in sales meetings and conventions more believable, more pointed and the whole project more integrated. Satire and humor injected into some of the skits comes through better because the audience can recognize the situations and types being caricaturized.

Armstrong feels that its use of audio-visual materials at sales meetings and conventions has increased to the point where it is making a substantial saving by having its own organization do the work. There are enough projects against a staff member's salary to make the salary insignificant in relation to the costs of the projects if they had to be sent out. The cost of films for example has been cut by almost 50 per cent. The company has also acquired gradually a large amount of equipment necessary for this kind of work. Its investment is large but the money spent is fairly insignificant when averaged out over the number of projects which have been completed since the equipment was bought. By investing in equipment, the company does not have to pay out large amounts in rent.

How is Armstrong's Special Promotions group set up?

Members of the Special Promotions Section have a thorough knowledge of the company's business and methods of operation. They operate as a task force on many types of projects—as a group, or as individuals who become writers, directors or producers as the occasion demands. This Section is part of the Advertising, Promotion and Public Relations Operation. Max Banzhaf is Director of the Operation. Craig W. Moodie is Manager of the Advertising and Promotion Department and Donald G. Goldstrom is Manager of the Special Promotions Section. All of the persons hired for this section are potential management prospects, rather than being show business people.

Special Promotions is able to broaden its reach by utilizing the services of the company's large staff Services Department, which include Photographic, Art and Decoration and Display Sections among others. The Decoration and Display Section is fully equipped to construct beautiful room settings to display materials and to offer technical interior decorating assistance for the various projects. This section also constructs sets and staging for conventions and sales meetings and films. An Art Department gives access to a variety of sources for slides, animation, charts, displays and other related materials and services.

Special Promotions also has access to a well-trained Company Chorus and other personnel for sales meetings and conventions. Through the years a pool of highly polished performers has been built up so that they can be used for conventions, meetings or for movies.

Over the years, Armstrong has acquired a large amount of production equipment which includes a large auditorium with complete and modern equipment, cameras such as a 16mm Arriflex recording equipment and all the other paraphernalia necessary for this kind of work.

The auditorium and its vast amount of equipment and the staff's experience in this field are the two important reasons for Armstrong's success at staging its own sales meeting or conventions and producing its own films and special promotional events.

Goldstrom points out that because of the completeness of the auditorium and stage, Armstrong has wide latitude in the type of presentations it can make. It is not generally restricted by having to adapt the show to the auditorium and equipment. Many companies have to go out to rent a banquet hall or auditorium and then they are limited by the size of the hall and the facilities.

Armstrong opened its auditorium in the General Offices at Lancaster, Pennsylvania, in 1949. Utilizing the most modern materials, decoration and design, the 650-seat structure has a professionally equipped stage, public address and lighting systems, facilities for broadcasting, and an electric organ. It is constructed as a unit, with foyer, cloak rooms and a large display area where permanent displays of the more than 350 company products are exhibited.

It is equipped with outstanding stage, projection and lighting facilities. An unusually spacious fireproof eight-port pro- (*continued on page* 76)

Kodak
TRADEMARK

He has been a Navy jet jockey, but now he has to make film for observing flying vehicles rarely ridden in.

He became interested in photographic technique while working for Kodak after school, but now he is a customer and a tough one.

J. A. Otto (left) of Kodak meets W. W. Topping at an up-range tracking telescope station. As the man in control of Kodak Linagraph Shellburst Film for cinetheodolites, Mr. Otto has come out from Rochester to the New Mexico desert to describe in detail to Mr. Topping certain changes he has made in the product. They involve hardening of the emulsion for high-temperature processing and an increase in the ratio of red- to blue-sensitivity to increase the precision of measurements on distant orange-painted objects against the blue sky. Mr. Topping is supervisor of the photographic group of Land-Air, Inc., range data-gathering contractors at White Sands Missile Range.

On a busy day, Ward Topping may have to put through film from 18 missile missions, each covered by perhaps 25 cameras along the range. All the footage has to be delivered ready to read by seven the next morning, and the data-evaluation contractor has to like the quality. All John has to do is make the film that goes in the cameras good enough for Ward to like it. It's called **Kodak Linagraph Shellburst Film** and is available to all from Kodak dealers in 16mm, 35mm, and 70mm widths.

Photorecording Methods Division

EASTMAN KODAK COMPANY, Rochester 4, N.Y.

SEEING SOUND

Harold L. Johnson and Marshall M. Cooksey, Engineering Experiment Station, Georgia Institute of Technology, put sound waves on photo paper

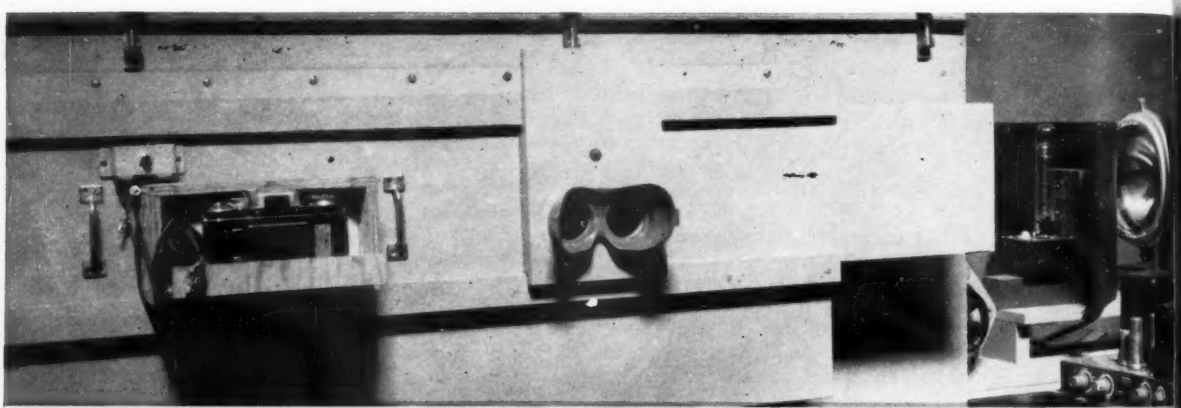
How to photograph sound waves in a glass tube! This was the problem.

As an outgrowth of a project to determine the effects of sound on fluid flow in tubes, it was found necessary to see how the flow looked and how it reacted to variations in frequency and amplitude. A photographic record of the patterns of standing waves and velocity directions assumed by smoke particles within the tube was desired. Cigarette smoke was chosen in this case for it is known that this smoke is an effective medium for visualizing velocity streams in air.

The glass tube used was Pyrex, 4 ft. long and 90mm in diameter. It was mounted horizontally in a sound-absorbing box—painted flat black inside to absorb stray light. A sound driver and horn at one end of the tube generated the sound waves. The other end of the tube was reserved for the introduction of light necessary for visual examination and the taking of photographs. Diagram illustrates the experimental set-up.

In order to see the smoke action within the tube, it was necessary to illuminate a plane of the tube rather than the whole interior. Illustration shows a spotlight mounted behind a vertical slit aperture and on the same axis as the tube. The light which passed through the slit and into the box was collimated through a 13½-in. f/3.5 aerial camera lens. The result was an illuminated vertical plane of light down the center of the tube. This light, though excellent for visual study of smoke patterns, was not sufficient for photography. The spotlight used for visual observation was a Par 64 sealed beam lamp operated from an S649 Powerstat at approximately 190 volts. This gave a total light output equivalent to 5,000 watts of normal incandescent illumination. The slit aperture in front of the lamp passes only about 10 per cent of the available light and the slit aperture in front of the collimating lens passes only another 10 per cent of the remainder, leaving only about 1 per cent or 50 watts in the collimated plane in the tube.

For all photographic purposes,



therefore, an alternate system was devised. A special straight flashtube with a lighted length of 4 in. and with the same electrical characteristics as an available, portable 200-watt-second electronic flash unit was purchased. This tube was mounted as shown in drawing and was wired exactly as the flash head which it replaced on the commercial unit, including trigger outlet and ready light. A pivot arrangement allowed the flashtube to swing in or out of position directly in line with the axis of the tube. It was a simple matter then to sight the smoke action visually with the spotlight, swing the flashtube into position and fire.

A 35mm camera was mounted on a movable slide which permitted the photographing of any part of the length of the tube. See photo.

The film used was black-and-white, Agfa Isopan Record, an extremely fast film with adequate resolution. The camera used was an Exakta with an f/2 Biotar lens. The camera settings were lens opening f/2 and shutter speed 1/50 sec. The range of focus was slightly in excess of 1¾ ft.

Experimental design for capturing sound

The experimental design for picturing sound waves is shown in the photograph and drawing *(left)*. The waves of sound are set up by a horn at the left of the apparatus. Their effects on the air within the 4-ft. glass tube encased by the apparatus are made visible with cigarette smoke, a ready and reliable indicator. Incandescent light for viewing and electronic flash for photography are confined by a slit to a plane which passes through axis of tube. Camera and viewing ports slide on tracks which extend the length of the sound tube.

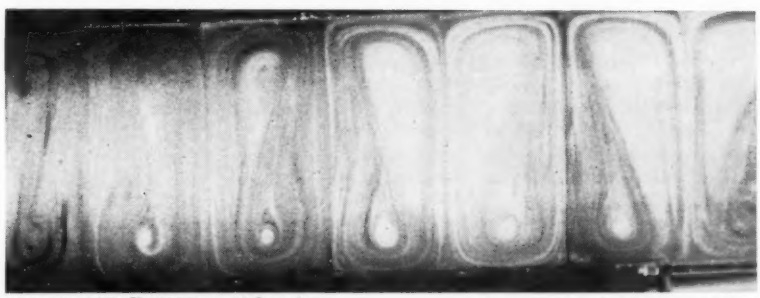
*This research was supported in part by the United States Air Force under Contract No. AF 49(638)-459 monitored by the AF Office of Scientific Research of the Air Research and Development Command.

Frequency and amplitude make their mark in tests

15 watts 118.5 db 1090 cps

50 watts 116 db 1735 cps

25 watts 115 db 1775 cps



10 watts 110 db 2230 cps (above)

9 watts 107 db 2240 cps (below)

TRAVELING MICROSCOPE

Anyone who works with photomicrographs knows how hard it is to take a series of photomicrographs of a single flat subject and have complete control over exposure and focus. Much time and many headaches have been saved in making photomicrographs at the Pittsburgh Plate Glass Research Center with the newly-invented traveling microscope of Frank H. Heck, Jr.

The problem which Heck's device answers was stated at a meeting of the Grinding and Polishing Section of the company in Crystal City, Mo. A plan was discussed to evaluate the surface of the glass as it comes off the line at various plants by means of photomicrographs. It was tabled because of technical difficulties: it would be impossible to have one person make the pictures at various plants, slight differences in technique, e.g. focus, would give a difference in results, and only very small sections of the product could be conveniently recorded.

Heck's inspiration for a solution came at a convention of the PPofA in Washington, D.C. A military display featuring high-speed photography and aerial photo reconnaissance attracted his attention. The aerial techniques set the gears in motion.

Essentially the finished machine is a continuously-scanning viewing mechanism and low power photomicrographic camera. The major advantage of the instrument is that it can scan and photograph a continuous section of any flat surface while assuring uniform lighting. The lights and the microscope lens remain in the same position relative to each other while the subject is being photographed. Although hardly portable, the machine is movable on large-diameter rollers.

In making a photograph, the specimen is mounted on the stage of the instrument. It remains stationary. The camera is driven across the subject with a worm-drive. In microcosm, this simulates the flight of an aerial reconnaissance plane over terrain. The film (70mm rolls) is tracked along the focal plane in synchronization with the camera. There is no shutter; instead, a slit "wipes" the image on the film. Even during exposure, the image may be viewed optically because a split mirror reflects part of the image to a viewing screen.

A simplified drive control is provided for shooting at different speeds and magnifications. To insure vibrationless operation, an efficient motor drive is used in conjunction with timing belts.

Although all the work done to date with the traveling microscope has been done at a single magnification, the machine is designed to effect other magnifications. A change of lenses and timing belts does the trick.

A built-in control permits viewing without running film through the camera. Another device automatically stops the machine when it has covered the specimen. An electrical control coupled with a variable slit changes exposure.

The 16mm Micro-Tessar lens results in a magnification of 30X.

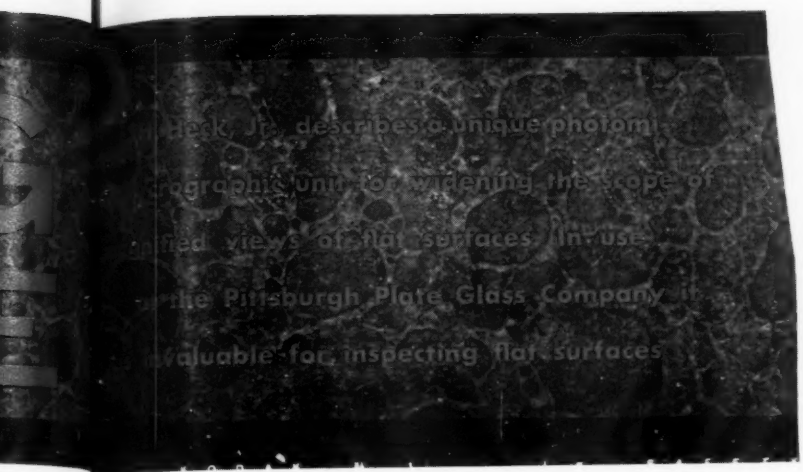
The camera accommodates a 100-ft. roll of 70mm daylight-loading perforated film. This film can be purchased for about $10 per roll. If magnified viewing is not desired, or copies are not to be made, it is possible to use 70mm paper. The film is attached directly to drive spools to assure uniform spooling; no special leaders or tape are required.

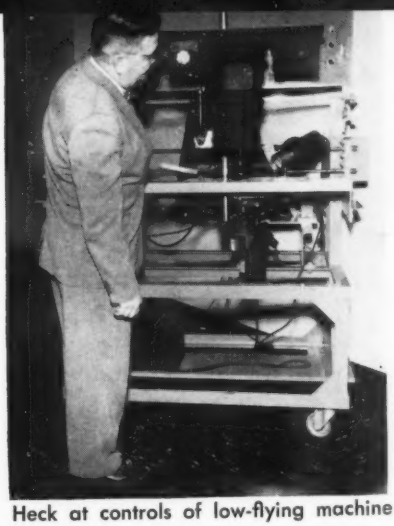
Complete processing in a 70mm automatic Fairchild processor requires less than 30 min. At a magnification of 30X, of course, one inch of subject matter requires 30 in. of film, and a roll of 100 ft. will scan about 40 in. of subject.

For studying the photographic results, PPG researchers use a 70mm roll-type microreader. This is equipped with a 5X and 9X magnifying lens for convenience in studying the 70mm negative strips. Final magnification is 150X or 200X.

The primary reason for the building of the traveling microscope is its use as a quality control instrument in glass manufacture. But as such a fascinating and useful device, it has found other applications including metallurgical studies of metal surfaces, and studies of the flow and drying properties of paints, lacquers and varnishes. In one study, the unit was used to study the ribbing of vinyl materials. This helped select the type of vinyl best for a particular kind of glass lamination.

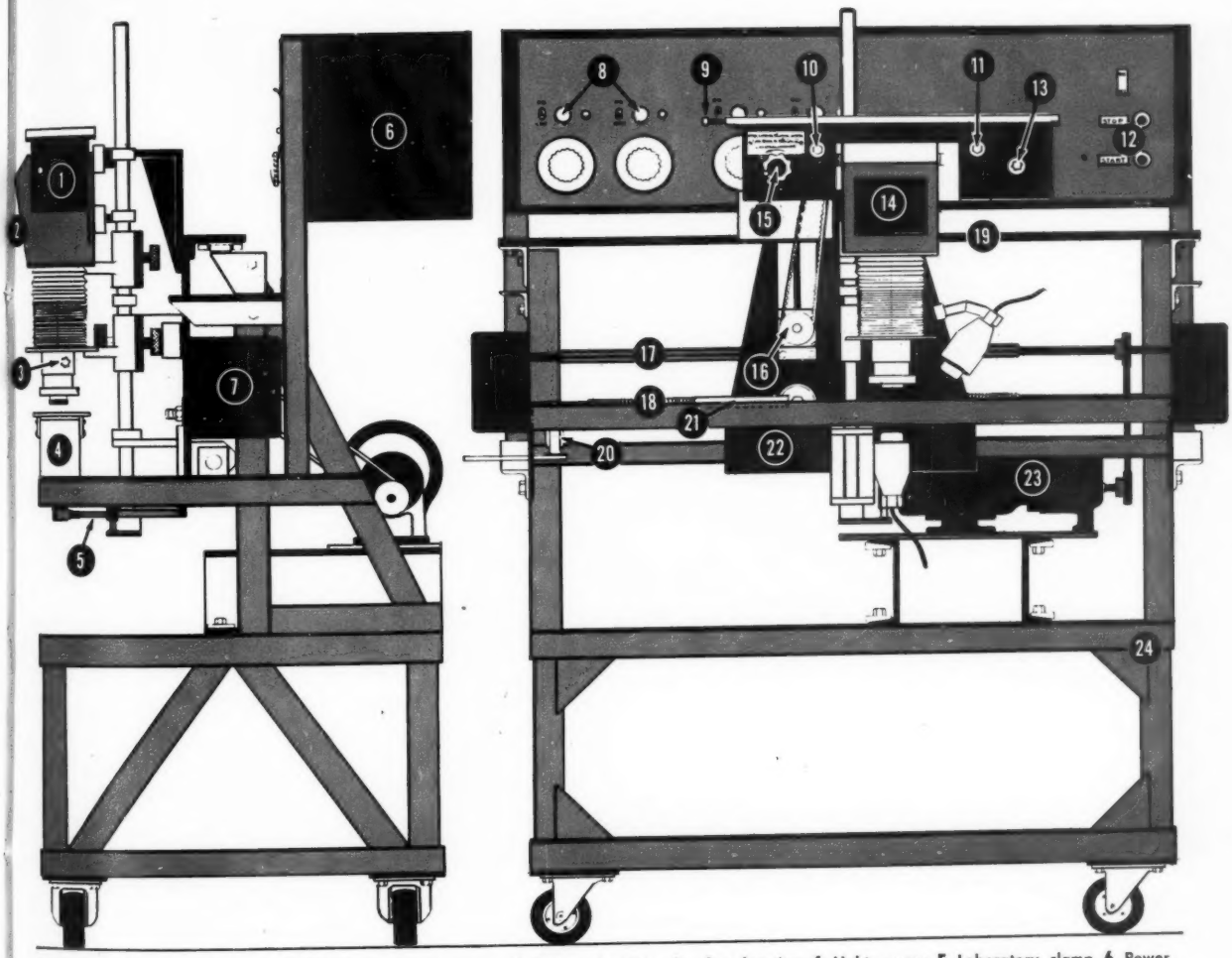
As one member of the organization puts it, "As a viewing device it has been a godsend, while as a means for continuous photomicrographs it is unequaled."—THE END





Heck at controls of low-flying machine

◁ 30X study of mature stain on glass



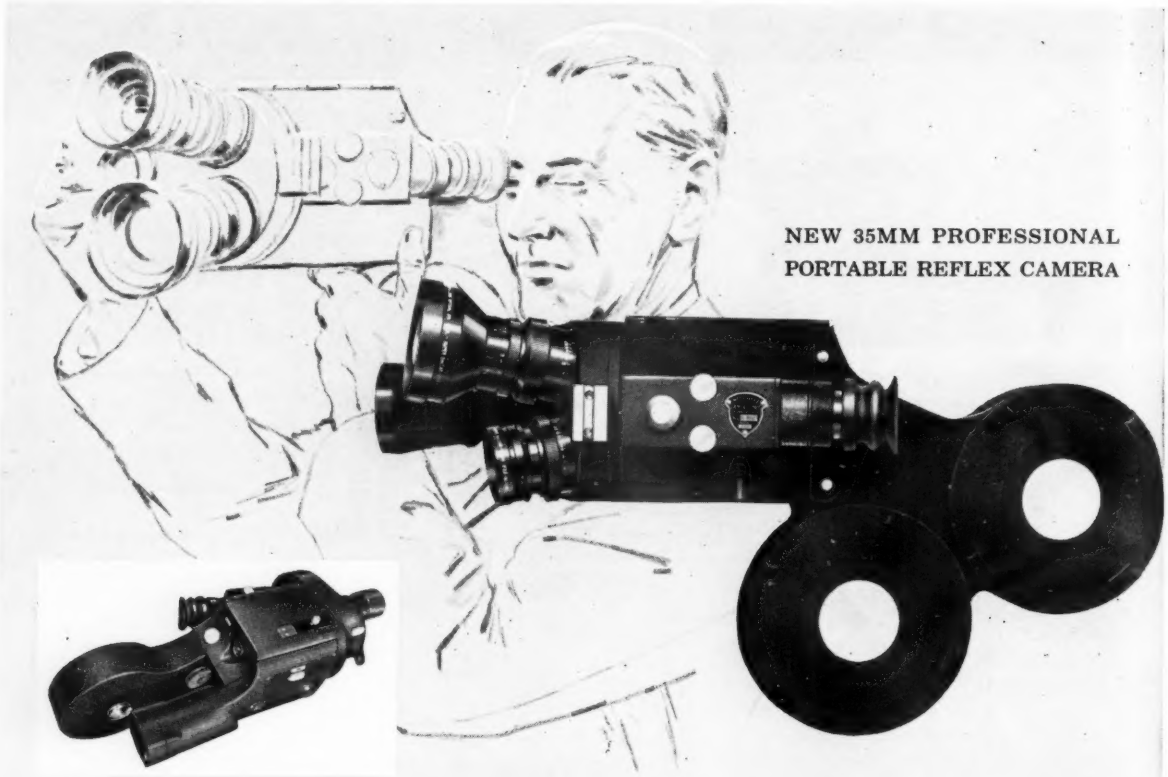
1 Reflex viewing mirror (concealed) **2** Photographic microscope **3** Rack and pinion for fine focusing **4** Light source **5** Laboratory clamp **6** Power panel; light switches, power switch, film travel, and camera travel **7** Interchangeable gears for variable magnification **8** Carriage drive **9** Dark slide **10** Film drive **11** 70mm film **12** camera controls **13** Daylight loading spool **14** Viewing screen **15** Take-up spool **16** Timing belt drive **17** Splined shaft to convey rotary power to film **18** Threaded shaft for microscope carriage travel **19** Camera guide bar **20** Relay to flip handle of engagement jaws for travel limit **21** Engagement jaw control **22** Camera carriage **23** Gear motor drive **24** Angular steel frame

NEW

MITCHELL R-35 *Reflex*

Hand Held or Tripod Mounted*

Here for the first time *is a 35mm reflex motion picture camera which combines streamlined lightweight design with the full range of professional features. Its superbly engineered design by Mitchell—the world's leading source of professional motion picture cameras—assures a remarkable versatility in filming. Among the broad capabilities of the R-35 are: theatrical and television productions—on location and in the studio; underwater use; high speed instrumentation films; and both animation and stop-motion.*



NEW 35MM PROFESSIONAL
PORTABLE REFLEX CAMERA

This camera produces steady, brilliant pictures through its use of dual registration pins and dual pull-down claws. A special series of Super Baltar matched F 2.0 lenses were specifically designed for the R-35 by Bausch & Lomb. Variable opening disc shutter provides positive exposure control. By means of a simple adaptor the R-35 can be used with standard Mitchell 1000′ magazines for tripod mounting. These are but a few of the outstanding professional features that make the Mitchell R-35 a major cinematic development. Send for the new R-35 Bulletin. *Tripod adaptor and blimp available as accessories.

MITCHELL R-35

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See the new Mitchell R-35 at the SPIE Convention in Los Angeles, Calif.

Get more information. Circle 473, page 85

HYZER ON HIGH SPEED

How many frames per second must you use before your image is too blurred to be of use? This chart, based on subject velocity, will tell you

Theoretically, the resolving power resulting from an image in motion relative to the film is given by:

$$\text{R.P.}_m = \frac{2}{b} \qquad 1)$$

where: **R.P.**$_m$ *is resolving power of moving image, lines/mm; and* **b** *is image blur, mm.*

It was shown in a previous article that the reciprocal of over-all resolving power is roughly equal to the sum of the reciprocals of the resolving power of the film, of the lens and of the other optical components in the system. If the maximum attainable resolving power for a given lens-film combination is 50 lines/mm (a typical value) and a resolving power of 20 lines/mm is satisfactory to record detail in the moving subject, what value of image blur is tolerable?

$$\frac{1}{20} = \frac{1}{50} + \frac{1}{\text{R.P.}_m} = \frac{1}{50} + \frac{b}{2}$$

b = .06 mm (or approximately .002 in.)

In 16mm practice, a .002-in. blur corresponds to 1/2 per cent of the frame width. The chart shown below was constructed on the criterion that a blur equal to 1/2 per cent of the frame width is acceptable and on this basis the chart is applicable to all motion picture film sizes.

Subject velocity parallel to the film plane is given at the bottom of the chart. A vertical line is drawn from the appropriate velocity to the curve corresponding to the width of field (W) to be covered by the camera lens. If the velocity is in feet/second, W is in feet; if velocity is in inches/minute, W is in inches; etc. A horizontal line is drawn from this intercept to the shutter constant (ρ) of the camera. The shutter constant for a given camera is defined as the exposure time corresponding to a picture frequency of one frame/second. Typical values for high-speed cameras are 0.3 for a Magnifax camera, 0.5 for a Fastax WF-3 and 0.03 for a Dynafax with its smallest diamond stop. A vertical line is drawn from this intercept to find the required picture frequency, in frames/second if the subject velocity was measured in inches, feet or miles per second or in frames/minute if velocity was in terms of displacement per minute. As stated previously, the chart is based on an acceptable blur of 1/2 per cent of the frame width, directly applicable to 16mm practice. If less blur is desired, picture frequency should be increased in inverse proportion.

Example: A machine element moving parallel to the film plane has a velocity of 100 inches/second. The field width to be covered is 5 inches. What picture frequency is required with a Magnifax camera, $\rho = 0.3$? With a Dynafax, $\rho = 0.03$. A vertical line is drawn from 100 on the velocity scale to the line corresponding to a field width of 5. A horizontal line is drawn to the line corresponding to $\rho = 0.3$ and vertically from there to the picture frequency scale.

Picture frequency for $\rho = 0.3$ is 1200 frames/second

Picture frequency for $\rho = 0.03$ is 120 frames/second

From this example, the advantage of a rapid shuttering action becomes apparent. If it is desirable to decrease the blur to 1/4 per cent of the frame width, picture frequency should be doubled in the above examples; for 1/8 per cent blur, picture frequency quadrupled; etc.

Ed. note: The above article will appear in Mr. Hyzer's book, *Photographic Techniques of Motion Analysis*, to be published by the Macmillan Co.—THE END

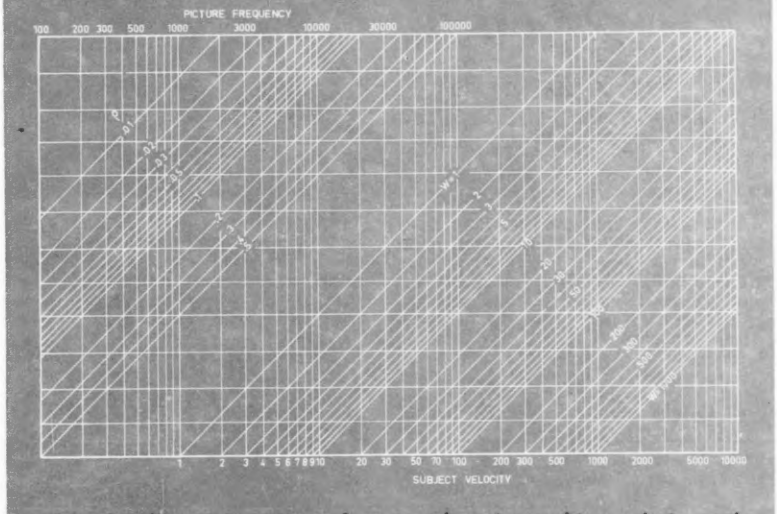
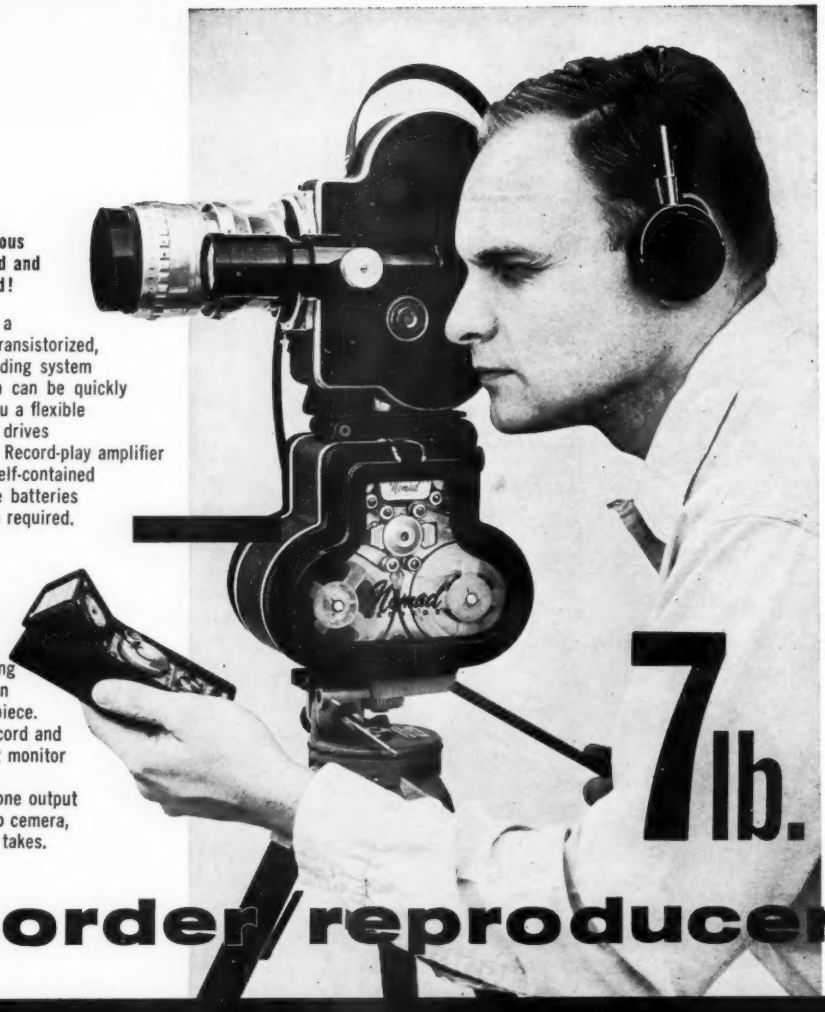


Chart for determining picture frequency based on subject velocity and limits of required resolution



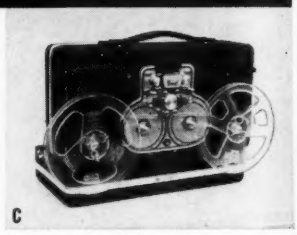
At last...
all the answers for the serious cinematographer with a need and desire for professional sound!

This precision instrument is a completely self-contained, transistorized, portable and versatile recording system to which any 16mm camera can be quickly mounted and interlocked thru a flexible cable. Camera spring motor drives recorder in absolute "sync". Record-play amplifier is fully transistorized with self-contained cadmium-nickel rechargeable batteries ... no other power source is required.

Remote hand mixer permits control of recording levels by thumb movement... giving operator a "feel" for position while concentrating on eye-piece. Mixer contains VU meter, record and playback controls, film-direct monitor switch, battery test switch, microphone input and earphone output jack. Mixer may be clipped to cemera, tripod, belt or pocket during takes.

7 lb. recorder/reproducer

The amazing Nomad makes any movie camera a sound camera, any projector a sound projector in professional "lip-sync"



A. Nomad film is split 16mm. Channel #1 on the twin-track record head is used for lip-sync and narrative recording on location. Later, complimentary music from phonograph or tape recorder is "dubbed" on channel #2. Simultaneous playback thru the full width play head mixes music and voice, producing theatre-quality sound.

B. For lengthy sequences, a regular camera D.C. motor can be attached to the Nomad, driving both recorder and camera thru the flexible cable. There is a 180 rpm output in the Nomad camera interlock and a 1440 rpm output for projector interlock. Playback can be double-system, or a 1:1 interlocked transfer from recorder to a striped release print can be made with a magnetic sound projector.

C. Basic film capacity is 100 ft.; the use of simple adapters can increase capacity to 400 ft. or 1200 ft. Entire Nomad system fits compactly into small carrying case.

Editing is easy with an inexpensive synchronizer and a sound reader. Since each roll of Nomad film is exactly the same length as the picture film, points of reference for editing are easily provided.

price $585

Basic Nomad system consists of recorder-reproducer, remote hand mixer and camera mount. Other accessories are available.

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MAGNASYNC Magnaphonic SOUND SYSTEM

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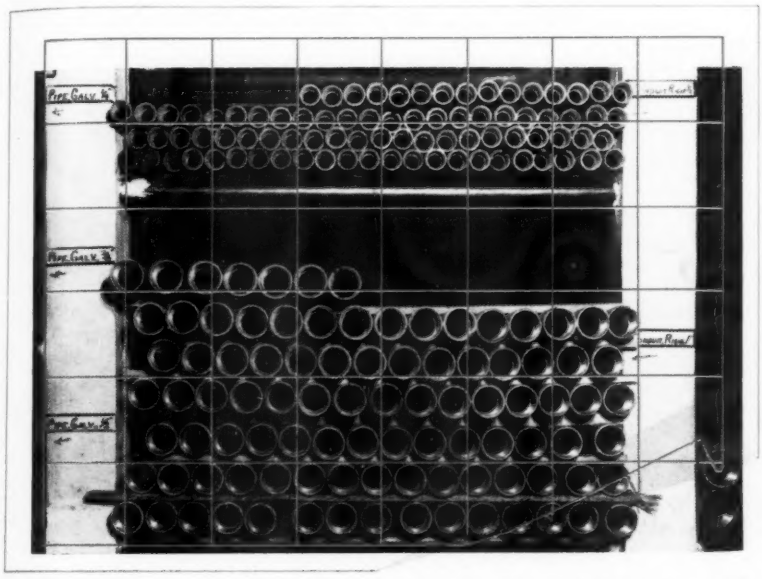
INVENTORY TECHNIQUES



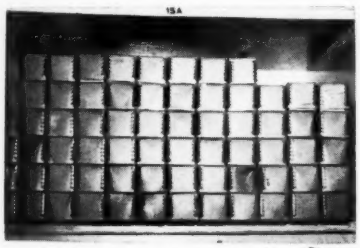
Fast count from photographs is easier with an overlay grid. Count the number of parts in one square and multiply by number of squares.

The basic fact that makes photographs so useful in taking inventory is that you can take a picture at inventory time and count the stock from the picture later. With fast-moving quantities of "in-process" material this advantage well repays any photographic costs by obviating production holdups.

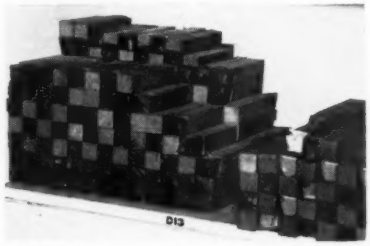
Even where speed is not a factor, photographs can effect considerable savings. Measuring stocks of bulk material such as coal is a good example. The stereo pairs obtained on two passes with a plane fitted for aerial mapping yield stock estimates that are up to 95 per cent accurate and slice 25 per cent from the survey costs. This beats a surveying crew's tramping over stockpiles with measuring chains.

With the photographs (*left*) reprinted with permission from *Flow* magazine—Dr. James H. Greene, Associate Professor of Industrial Engineering at Purdue University and Murray Raymond, Jr., Transport Division, Boeing Aircraft, illustrate orderly techniques for making inventory photographs.

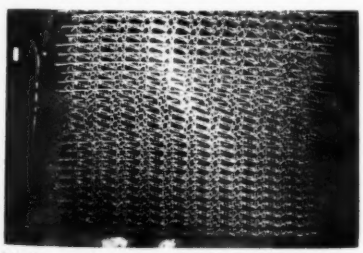
They emphasize that the system must be well thought out from beginning to end. A crucial matter in many applications is camera position. The warehouse or storage area must have pre-determined, plainly marked camera stations. Together they must enable the photographer to catch the whole stock.



Keeping stock closed up facilitates inventory. Arrange broken lot to show up in photograph (see open lid).



Oblique view is often necessary to display length, second row, and other facts. Photos improve housekeeping.

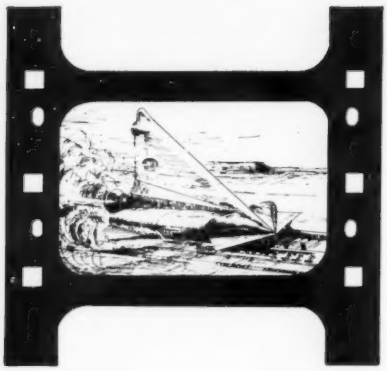


Wide-angle lens used for this photo is most helpful accessory for inventory work. An enlargement helps count.

Camera stations, taken together, must be all-inclusive. Pictures do not interrupt production, cut pilferage.

TAKE INVENTORY WITH PHOTOGRAPHS AND . . .

Eliminate production delays and shutdowns caused by physical counting of stock. • Reduce labor costs. Have counting done by office clerks, rather than high-paid direct labor workers and supervisors. • Enforce better housekeeping and reduce handling damages. Workers will want their department to look neat in a permanent photographic record. • Reduce pilferage. You can take the inventory with employees who are not regularly assigned to the stockroom. • Streamline record keeping. There are no inventory tickets to fill out. • Reduce inventory sizes by getting material into production faster. • Have a permanent and accurate record of the inventory on specified dates.



PRECISE TIMING

from a miniaturized source

The Steinwood Tri-Pulse Generator

A common time base for many stations

The Steinwood Tri-Pulse Generator provides for precise comparison of simultaneously recorded action. A preselected frequency of 10, 100 or 1,000 pulses per second can be recorded on the film of up to 10 cameras, enabling the data reduction man to correlate information from a known time standard.

COMPACT — Less than 1.5 pounds.

RELIABLE — Performs within 1% of selected frequency.

PORTABLE — A miniature 30 volt battery for power source.

RUGGED — Operates under heavy G loads.

SELECTIVE — 10, 100 or 1,000 pulses per second.

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by Ernest E. Reshovsky

PHOTO INSTRUMENTATION

Automatic dodging: a new approach to an old printing problem

During the SPSE Conference (PMI, June, 1960), a new approach to automatic dodging in photographic printing was described. The method discussed should have wide application on the basis of its reported simplicity and speed. William S. Forrester of Ramo-Wooldridge Labs delivered a paper on the subject, based on a study conducted at the Aerial Reconnaissance Laboratory, Wright Air Development Division, U.S. Air Force.

Forrester described various dodging methods now in use, none of which, he felt, were completely satisfactory.

Manual dodging, burning-in, vignetting, masking, depend upon the ability of the darkroom technician and are highly subject to human error and mood.

A more sophisticated approach is the use of multiple-light sources. These are built as banks of lights which can be controlled by the operator. He establishes an *on-off* pattern of lamps in the printer in accordance with the contrast and density of the negative. This method allows duplication of the dodging effect but it is still subject to human error. Different operators will establish different lamp patterns for the same negative.

Automatic dodging by means of a cathode-ray tube with a flying spot scanner is most successful. This method permits automatic dodging with consistent, reproducible results. It is also possible to dodge smaller areas with this system than with other systems. Drawbacks include the high initial cost of the printer and expensive parts replacement. The rate of production is limited by the lower output of a cathode-ray tube compared with a high intensity light source.

The study at Wright Air Development Division of automatic dodging controls was designed to develop an automatic dodging method permitting maximum resolution and optimum acuity. The study came up with a simple method of controlling the latent image by use of infra-red radiation.

Experiments were conducted with the known ability of infra-red to quench a phospher excited by ultra-violet. In this method, a contact printing package is a sandwich: phospher screen, negative and printing material. An ultra-violet source is placed on the phospher screen side of the package and an infra-red source placed on the printing material side. Exposure is made by activating both light sources simultaneously. The infra-red produces a quenching action by passing through the printing material and the negative to form a light, positive image of the negative . . . in fact, an unsharp mask . . . on the phospher screen which becomes fluorescent during exposure. The exposing ultra-violet light, passing through the quenching image on the screen and the negative produces a dodged latent image on the printing material.

This method, however, has limitations; namely, poor resolution, low rate of operation and the narrow range of dodging possible in high-light areas.

The experiments at Wright indicated that some unknown factors were affecting the results adversely. Further testing revealed that the same wave length of light that was being used to form the positive image on the fluorescent screen was also acting to partially erase the latent image on the printing material. Using this discovery, the idea was developed that perhaps this erasure effect could, in itself, be used as a method of automatic dodging control. Suppose the infra-red were modulated by the negative densities instead of being applied directly to the base of the printing material.

In this manner, dodging is accomplished by directing both actinic and infra-red radiation through the negative onto a photographic printing

(*continued on page* 62)

Processes up to 150 ft. of film per min.

When your 16mm and 35mm black and white film processing requirements call for high speed and/or high volume, the Houston Fearless Model S120PN Rapid Spray Processor will do the job superbly well. High-impingement jet-spray application of the developing solution, fix and wash (as well as impingement drying) makes possible processing of positive film at 150 f.p.m., negative film-at 100 f.p.m. Complete cycle at top speed is only 5 minutes, dry to dry.

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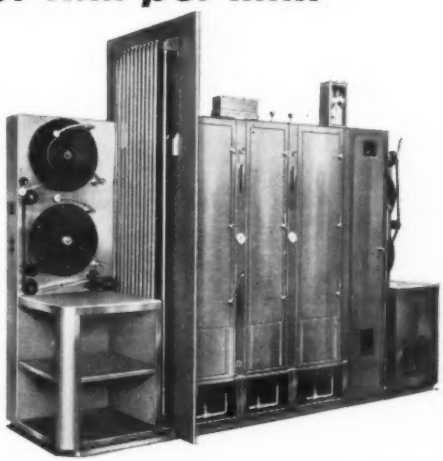

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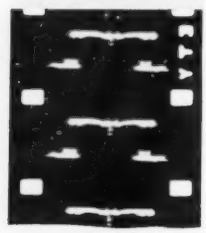
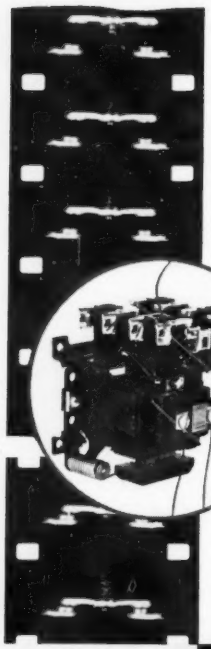
Actual reproductions from FASTAX high-speed films, taken at 7,500 frames per second, used to analyze contact operation.





How Allen-Bradley uses *FASTAX* to check super-speed components

Allen-Bradley engineers had to *know* how contacts in their motor control relays stood up under stress, when operating too fast for the human eye to follow.

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Later, when projected at slow speeds, Allen-Bradley engineers could examine the structural behavior of relay components—contacts, plungers and springs. Motion studies like this have helped develop better relays for A-B customers.

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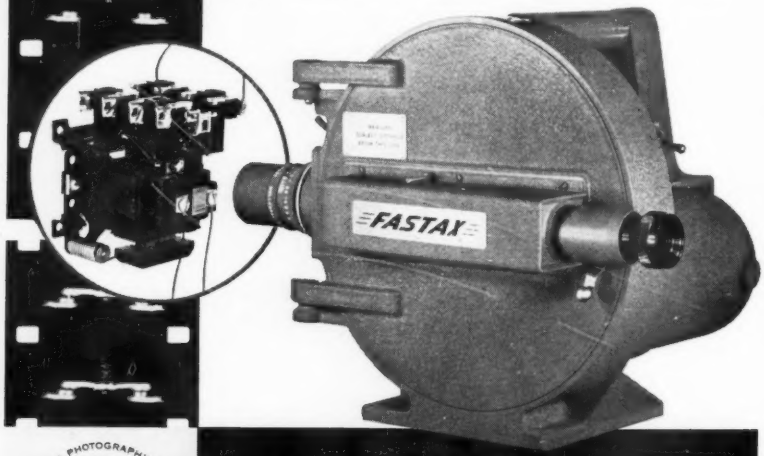

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(*continued from page* 60)

emulsion. The actinic light forms the usual latent image; the infra-red light erases the image. Thin areas in a negative produce a dense latent image during exposure to actinic light. However, these same thin areas pass the largest amounts of infra-red radiation, thus providing a strong erasure action. As the densities in the negative increase, there is less exposure and less erasure. The result is an automatically masked print.

Tests were made using photographic step wedges to establish the dodging potential of the new method. Positive material was uniformly pre-exposed by white light to elevate the threshold density level so that detail would not be lost in the highlight areas of the final print. A negative with a step wedge was placed in contact with the pre-exposed material. This material was slightly overexposed by a white light source to form a latent image. The printing material was then exposed through the negative by infra red radiation to achieve the erasure effect. Results of these tests may be seen in the curve shifts (*Fig. 1*).

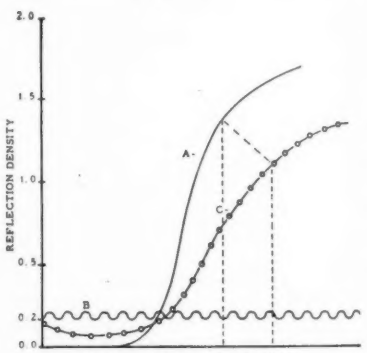

Fig. 1 Curve shift after exposure to white, infra-red. New curve is C.

During the experiment, it was fully confirmed that the extent of the erasure is determined by the density level of the negative, thus providing automatic dodging. It was also determined that control of the latent image formed by white light could be achieved by simultaneous exposure to infra red radiation, if desired.

(*Figure 2* illustrates a method of dodging, by simultaneous exposure; *figure 3* shows a method using two separate exposures.)

The erasure is known as the Herschel Effect and is described by Jones and Higgins in *Fundamentals of Photographic Theory* as follows:

(*continued on page* 80)

The Society of Photographic Instrumentation Engineers and the United States Air Force Jointly Present the

SPIE 5TH ANNUAL TECHNICAL SYMPOSIUM PROGRAM — 1, 2, 3, 4 AUGUST 1960

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MONDAY, 1 AUGUST 1960

4:00 to 6:00 p.m.	Pre-registration (Convention Lobby)—Press and Management Preview Exhiborama—Press Conference (Press Club)
6:00 to 7:30 p.m.	Cocktail Reception for Press and Guests (Exhibit Area)
8:00 to 9:30 p.m.	Keynote Program — Guest Chairman: August C. Esenwein, Convair Division, General Dynamics Corporation—Guest of Honor and Principal Speaker, Lt. General C. S. Irvine, (USAF ret.) Avco Corporation — Commentator for SPIE, Dr. Lewis Larmore, Lockheed Aircraft Corporation
9:00 to 10:00 p.m.	Operations Committee Meeting—Technical Sessions Committee Meeting (Executive Suite)

TUESDAY, 2 AUGUST 1960

8:00 to 10:00 a.m.	Exhiborama Openhouse and Coffee Bar — Registration — Security Clearance — Press Conferences
10:00 to 11:00 a.m.	Elements of the Photo-Instrumentation System—Amrom Katz, Rand Corp.
10:00 to 11:30 a.m.	Survey of Miss-Distance & Firing Error Systems (Seminar)—Moderator: Albert J. Misevic, PMR
10:00 to 11:30 a.m.	Survey of Rocket Motor Test Photo-Instrumentation (Seminar)—Moderator: V. R. Boulton, Aerojet-General, Sacramento
11:30 a.m. to 12:30 p.m.	Economics of Photographic Instrumentation (Seminar) — Moderator: Glen Sanderson, Lockheed Aircraft Corp.
12:00 m.	Luncheon Session (To be Announced)
2:00 to 3:30 p.m.	USAF Reconnaissance (Seminar) Classified-Secret — Col. Delwin Avery, Air Force Development-Planning
4:00 to 5:00 p.m.	Consideration of Photo-Instrumentation System Reliability (Seminar)—Moderator: Lawrence J. Fogel, Convair
4:00 to 5:30 p.m.	Recent Advances in Geometric Optics (Seminar)—Moderator: Abe Offner, Perkin-Elmer
4:00 to 5:30 p.m.	High Response Exposure Control Devices (Workshop) — Moderator: Dr. Lewis Fussell, EG & G
5:00 to 6:30 p.m.	Infra-red Recording Systems (Seminar) — Moderator: Dr Raymond McFee, Aerojet-General, Azusa
8:00 to 9:30 p.m.	Biological Medical and Human Factors Application of Photo-Instrumentation (Inter-Society Seminar) — Moderator: Dr. Irving Rehman, Consultant to NOTS-China Lake

WEDNESDAY, 3 AUGUST 1960

8:00 to 10:00 a.m.	Exhiborama Openhouse and Coffee Bar —Registration Press Conferences Security Clearance
9:00 to 10:30 a.m.	Recent Advances in Fiber Optics (Seminar)—Moderator: Dr. Walter Siegmund, American Optical
9:00 to 10:30 a.m.	Photo-Stereoscopy for Engineering Analysis (Workshop)—Moderator: John Wolvin, Chicago Aerial Survey
9:00 to 10:30 a.m.	High Speed Sequence Recording (Seminars)—Intermittent to 400 pps—Moderator: Morton Sultanoff, Aberdeen Proving Ground
11:00 a.m. to 12:00 m.	Some Applications of a Microdensitometer for Photo-Data Assessment—Albert J Derr, Ansco
11:00 a.m. to 12:30 p.m.	Advanced Photo-Receptors & Image Amplification (Seminar) — Classified — Moderator: Thomas Vogl, Hughes Aircraft
10:30 a.m. to 12:00 m.	High Speed Sequence Recording—Rotating Prism to 16,000 pps—Moderator: Morton Sultanoff
1:00 to 2:00 p.m.	Luncheon Session
2:30 to 3:30 p.m.	Survey of Sled & Track Photo-Instrumentation (Workshop) — Moderator: Neil Krenzel, NOTS-China Lake
2:30 to 3:30 p.m.	Army Combat Surveillance Systems Valuation Techniques (Seminar)—Moderator: Herbert Ide, Tech Director CS & AD
2:30 to 3:30 p.m.	High Speed Sequence Recording—Streak & Drum, 5,000,000 pps—Moderator: Morton Sultanoff
4:00 to 5:30 p.m.	Photographic Data Handling, Reduction & Analysis Techniques (Workshop)
4:00 to 5:30 p.m.	Extraterrestrial Photo-Instrumentation —Dr. Rostyshov Shavlach, RCA
4:00 to 5:30 p.m.	High Speed Sequence Recording — Image dissecting & grid framing, 150,000,000 fps—Moderator: Morton Sultanoff
7:00 to 8:00 p.m.	National Officers Cocktail Reception
8:00 to 10:30 p.m.	Banquet Session—Awards, Presentation of Officers—Principal Speaker: Col. Paul Worthman, USAF-BMD

THURSDAY, 4 AUGUST 1960

8:00 to 10:00 a.m.	Exhiborama Openhouse and Coffee Bar —Registration Security Clearance Press Conferences
9:00 to 10:00 a.m.	Comparison of Current Techniques for Rapid Photo-Data Assessment (Seminar)
9:00 to 10:30 a.m.	Survey of Sensitized Materials for Photo-Instrumentation Systems (Seminar) —Moderator: Comdr. Walter Fraser, USN, PMR
9:00 to 10:00 a.m.	Recent Advances in Electro-Optical Systems—Moderator: Dr. Harold Moore, Electro-Optical, Inc.
10:00 to 11:00 a.m.	Bright-Screen Projection Systems for Data Display—A. R. Fultz, Kodak-Hawkeye
10:00 to 11:00 a.m.	Recent Advances in Applications of Physical Optics — Moderator: Joseph Hull, AVCO/RAD
11:30 a.m. to 12:30 p.m.	Space-Data Assessment Systems - Samos Sub-System "I" (Seminar)—Classified—Moderator: Ernest Stern, Ramo-Wooldridge
1:00 to 2:30 p.m.	USN Luncheon Session—Rear Adm. Jack P. Monroe, USN, Cmmdr., Pacific Missile Range
2:30 to 4:00 p.m.	USN Hydrospace Studies (Seminar)—Moderator: Dr. C. O. Alexis, Scripps Institution of Oceanography
3:00 to 5:00 p.m.	Survey of Range Photo-Instrumentation (Seminar)—Moderator: Edward E. Rich, Space Technology Lab.
3:30 to 5:00 p.m.	Exhibitors Critique of 1960 Exhiborama (Workshop)—Moderator: R. H Lawrence
3:00 to 5:00 p.m.	Ultra-Rapid Film Processing—Moderator: A. A. Koepfer, Chief, Reconnaissance & Data Reduction Branch, WADD
5:00 to 6:30 p.m.	Joint Critique 1960 Technical Symposium (Seminar)—Moderator: Dr. Lewis Larmore, Amrom Katz, John Clemente
7:00 p.m.	S.P.I.E. Board of Directors Meeting—Dinner & Conference

SPIE 5TH ANNUAL TECHNICAL SYMPOSIUM & EXHIBORAMA OF EQUIPMENT — 1, 2, 3, 4 AUGUST 1960 — LOS ANGELES AMBASSADOR

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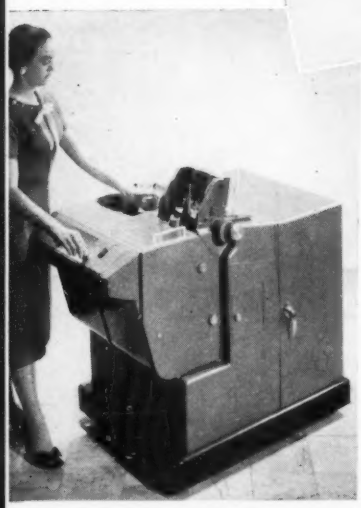
PMI IN-PLANT REPRODUCTION

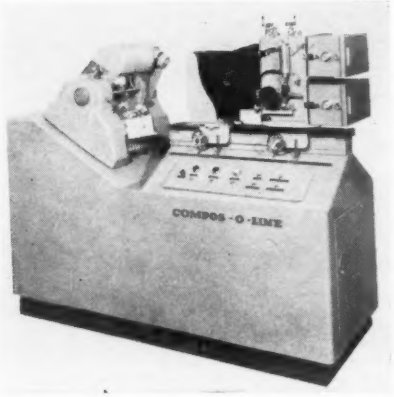
Sequential Card Camera Systems employ standard EAM (Electronic Accounting Machine) cards to store printable data for repetitive listings and directories. Camera films one, two or three lines on a single card . . .

A CARD AT A TIME

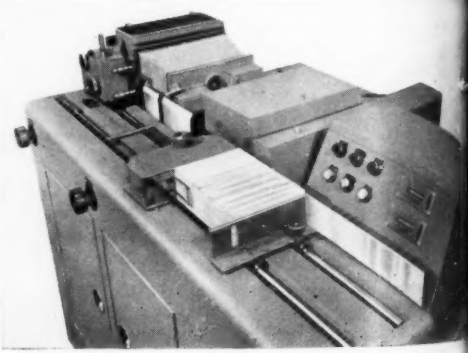


Recordak's Listomatic
Automated card camera has fast filming rate of 230 cards per min.

Lithoid's Compos-O-Line
Up to ½ of card can contain data to be filmed: coded cards set shutter



VariTyper's Foto-List Camera
Complete camera, below, details shown at right are: **1** Film feed lock knob **2** Film feed control **3** Film feed micrometer control **4** Descender and Ascender Mask control **5** Camera adjustment scale **6** Lens adjustment scale **7** Camera back **8** Goerz Dagor lens **9** Light housing

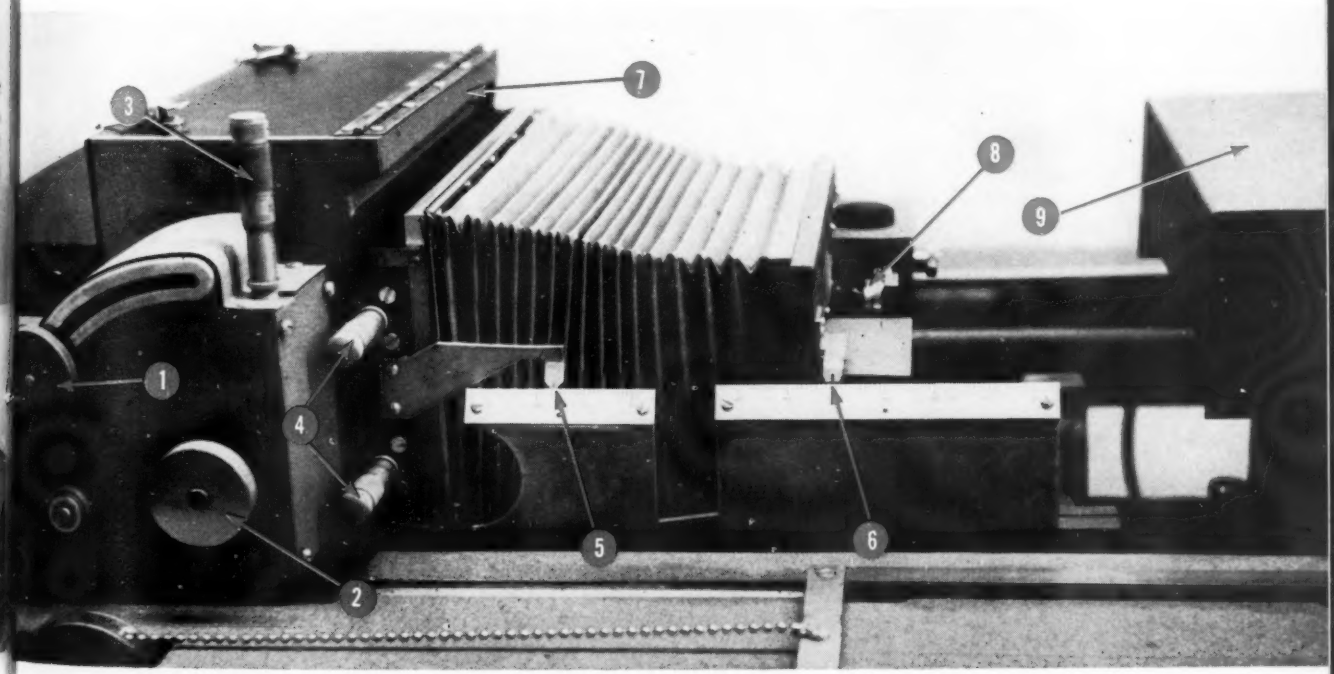


The ubiquitous EAM (Electronic Accounting Machine) card, used multifariously in the routine operation of efficiency-conscious concerns, invades the reproduction field. The tedious job of preparing listings, directories, etc. is being mechanized and automated to a large degree by the introduction of the sequential card camera systems—a photographic method of transferring data stored on file cards to list form for offset or letterpress reproduction. Lines of type as they must appear on the printed list are type set on the EAM cards using cold composition equipment or electric typewriters. Card sorting machines and counting machines are used to stack the cards in the proper order and to determine page make-up, then the automated camera films the cards at a high rate of speed. Processed film negatives or paper based positives can then serve for platemaking, letterpress engravings, or single proofs. The three systems currently on the market are Varityper Corp.'s Foto-List, Recordak's Listomatic and Lithoids's Compos-O-Line equipment.

Equipment for the Foto-List system are: Line Composers, Headliner, card counter and the automated camera, all manufactured by the Varityper Corp. The Listomatic and Compos-O-Line cameras are designed to operate with cards prepared on Varityper, Justowriter composers and electric typewriters with special card holding platens. A Listomatic film processor is available for automatic processing. The Foto-List camera films a single line on a card while the Listomatic and Compos-O-Line are capable of recording several lines on a single card. Coded cards are scanned by a photocell in the camera which regulates the shutter opening. Card filming rate with the Listomatic is 230 cards a minute and the other two run at 120 cards a minute. Varying film widths are used depending upon column widths for purposes of economy. The Listomatic and Compos-O-Line are capable of enlarging and reducing copy, Foto-List shoots same size and reduces up to 50 per cent.

To date this is one of the most efficient means of preparing listings in a hurry. The cost of the equipment is high ($13,700 for Compos-O-Line; $18,850 for Foto-List and $21,500 for Listomatic) but literally thousands of cards may be stored and maintained in a relatively small filing cabinet. Keeping the card file up to date is equivalent to having standing type ready to run at all times. Proofreading steps are virtually eliminated since all copies are photographic reproductions. Processed negatives seldom require much opaquing and single copies may be proofed up using projection positive stock.

The three systems are currently in use by governmental and industrial concerns throughout the country. General Motors is utilizing the Listomatic system for efficient preparation of catalogs, Dun & Bradstreet uses (*continued on page* 79)



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PMI IN-PLANT REPRODUCTION

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GRAPHIC ARTS

A new color film not for making pictures but for correcting them

Photographic masking is intended to overcome inherent deficiencies in color reproduction. But masking itself introduces any number of problems. For effective correction, three principal masks are required generally. Producing them may involve first making several intermediate masks. To avoid color distortion, the masks must be made to specific values and balanced to each other within close tolerances. Finally, making and using masks entails critical registration to make sure the component images coincide.

In an attempt to minimize the cost in time and material and reduce the chance of register error, many abridged masking systems are in use. While such methods do cut down on time and material they do so at the expense of the degree of color correction obtainable. Obviously, a neutral density mask (silver image) cannot be selective in its masking effect when used for more than one color separation. A mask used for more than one separation will either provide an average correction for the different separations it controls—or correct one adequately, while merely balancing out the others.

On the other hand, a mask whose density is colored (dyed) can vary its masking effect in accordance with its own color and that of the separation filter. A blue-colored mask combined with a transparency, for example, would practically be cancelled out while the blue-filtered separation negative is made. But with red and green light, a blue mask would have the same density as an equivalent silver mask and would thus exert a masking effect on the red and green separations. If this same mask were blue-green (cyan) instead of blue, it would cancel out through the blue and green filters but act as a mask through the red filter. It follows that any number of combinations are possible with images of different colors.

A masking system based on colored images[1] was proposed by the inventor of Gasparcolor over twenty years ago in connection with correcting transparencies. Dr. Gaspar's premise was that a negative image in the same color, density and gamma as one of the layers in a color transparency would provide positive and negative images of the same layer when combined with the transparency. The two being opposites would cancel out thus, in effect, eliminating that layer photographically. If two such masks were made in appropriate colors, one for each of two different layers, the combined effect would be to cancel out two layers and leave the third layer separable to a higher degree than otherwise.

Kom-Bi Films, introduced by Agfa[2] in 1954 followed closely the ideas of Dr. Gaspar. Kom-Bi films are similar to conventional multi-layer color films but differ in that they have only two color-sensitive and color-forming layers. Each of the three different Kom-Bi films is capable of providing an opposite record of two layers of a color transparency. One of each type of Kom-Bi film is exposed in contact with the transparency and processed. This results in three masks; cyan-magenta, cyan-yellow and magenta-yellow. Each mask is registered in turn with the transparency and separations made in the normal manner. In each case the separation filter is complementary to the layer of the transparency which has not been canceled out by the mask. Despite good color correction the Kom-Bi system offers no saving in time and material. It introduces even more critical tolerances in exposing and processing the masks.

The ideal system would provide the maximum correction with the minimum of effort and material–in short, one mask with the corrective features of a multiple mask system. Such a mask would reduce working time and the amount of material used. In addition, it would minimize

(*continued on page* 68)

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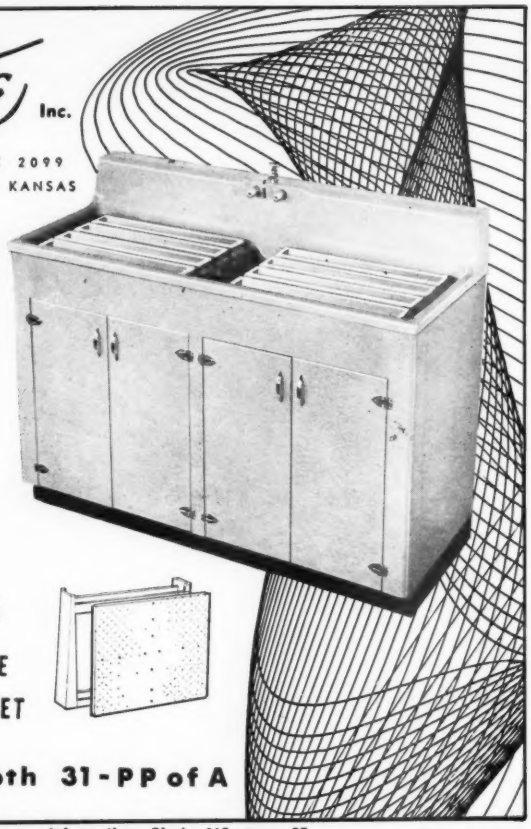

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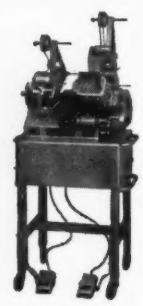
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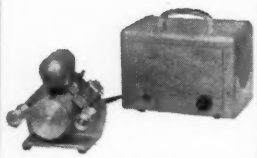
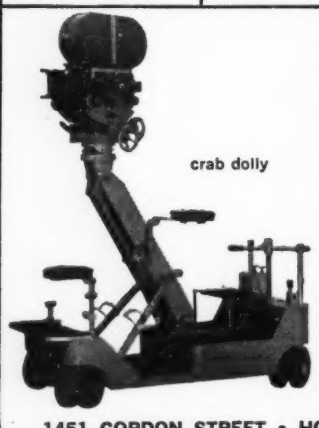
rewinders

video tape


sound readers

synchronizers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GRAPHIC ARTS

(*contniued from page 66*)

the registration problem. A single mask system is within the realm of possibility with colored images.

A step in that direction has been taken by the introduction of Multimask Film by Gevaert Photo Producten, Belgium[3]. The Gevaert method is based on a specially prepared multi-layer color film on a dimensionally stable polystyrene base (*see illustration*). Each layer has a definite selected color sensitivity and inherent contrast. Each layer contains a different color forming component. The uppermost emulsion is sensitive to both red and blue light and results in a magenta dye image. The second emulsion layer, containing a cyan coupler, is sensitive to blue and green light. Interposed between the second and third emulsions is a yellow filter layer. The final emulsion is sensitive to both blue and green light but, by the action of the intervening yellow filter, only green light is recorded. The three layers build up masking densities that are roughly equivalent to that of three silver masks made through cyan, magenta and green filters.

Multimask film can be used to make masks from negative and positive color transparencies by contact or projection. The latter ability extends its use to masked separations from reflection copy by camera-back masking. Color development, rinse, bleach-fixing and washing are the four simple processing steps that follow exposure of the Multimask film. When dry the mask is ready for use. According to how it was exposed the mask is either combined with the transparency or registered on the enlarger easel or camera film back. The

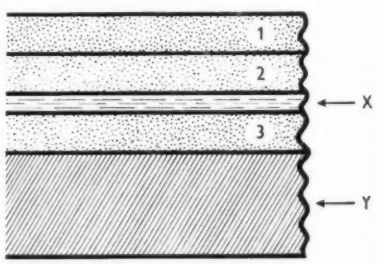

Fig. 1 - Section of a Multimask film
1 = emulsion layer containing the magenta coupler, sensitive to blue and red.
2 = emulsion layer containing the cyan coupler, sensitive to blue and green.
X = yellow filter layer.
3 = emulsion layer containing the yellow coupler, sensitive to blue and green.
Y = film base.

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latter two applications require a vacuum and pin register system for holding and locking the respective material. Color separations are made in the usual manner. The accuracy of the mask and the separation negatives is determined by means of a guide consisting of grey patches and color patches. The grey steps are used to control the mask while the cyan, magenta and yellow patches are used to evaluate the exposure and contrast of the separations.

Multimask film was first introduced abroad where it has been enthusiastically received. Users report excellent results with extreme simplicity and dependability. The company advises that Multimask material will be available in the United States late this year.—THE END.

References:

1: British Patent No. 494341.
2: Agfa *Repro-Mitteilungen*, No. 4,1954.
3: *Multimask: A New Method of Tri-Color Masking*, Paul de Pelsmaker and P. Cassier. (A paper presented at the 1960 SPSE Technical Conference, Santa Monica, Calif., May 11, 1960).

IND. MOTION PICTURES

(*continued from page* 28)

fusion and strengthening, but quite different. This technique can be used to shock an audience for effect.

As necessary as experience for a good pan is a good professional movie tripod pan head. A rough and poorly-designed pan head will give even the most experienced cameraman trouble. At one time, the beginner could use only the gyro head with any degree of success; now, there are at least a dozen good fluid pan heads obtainable at about a fifth of the price of a gyro and nearly as good. With a good tripod and practice, there is no reason why beginners shouldn't be able to get smooth movements.

Incidentally, I would like to recommend a useful and most unusual ten-day vacation for those interested in the film as a creative medium. The Robert Flaherty Film Seminar, sponsored by the Flaherty Foundation, is being held in Brattleboro, Vermont, beginning August 21, at Flaherty's lovely farm. Famous film makers show their films and analyze them. Rene Clair is one of the guest speakers this year. For details, write the Robert Flaherty Foundation, Brattleboro, Vermont. Only a limited number of students can be accommodated.—THE END

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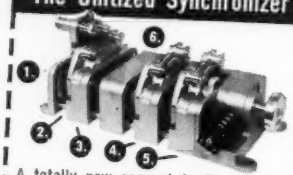

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Vernon Tate

MICROREPRODUCTION

The new military specifications: a giant, hesitation step forward

Engineering drawings and related documentation have been reproduced in microfilm for many years. Before and during World War II the fear of loss through accident, sabotage or even enemy action caused many organizations to embark hastily on microreproduction programs which had security for a principal objective with savings in storage space as a secondary dividend. In many instances these programs were successful; some were entirely useless, for they were poorly planned and badly executed. From the successful applications, however, a body of knowledge and experience slowly developed that clearly indicated that microfilm reproductions were not only completely feasible but were also economically and operationally desirable. Emphasis gradually shifted. The concept of security remained important and space savings were not overlooked but active integration of engineering documentation in many forms into the active working plan of industry became the central important theme.

The armed forces with innumerable contracts and projects for material found conventional production, correction and reproduction of engineering documents a formidable obstacle. The growing complexity of military equipment multiplied the number of required drawings and an increasing number of contractors did nothing to help the situation. When in August, 1958 the Department of Defense decided to launch a program for the standardization of procurement documents for microreproductions for the joint use of the Air Force, Army and Navy, more than fifty different sets of specifications, standards, instructions and related documents were in use by various service activities. More than 50,000,000 drawings existed in the active files and about 6,000,000 new drawings were being added annually.

The program, known by the acronym EDMS (Engineering Data Microreproduction System) was headed by representatives of the three armed services who worked in close cooperation with industry to identify the several components of the overall problem, and then to devise means that could be agreed upon by the military and industry alike. The resulting specification, known in the trade as the "Military Specification" would become the statement of contract requirements for acquiring and preparing the engineering data required for the logistical functions of the military agencies.

As the solution evolved it was agreed that 35mm microfilm would meet the greater part of the requirements in conjunction with 105mm for use in certain architectural and constructional applications. Accordingly two specifications, MIL-M-9868 for microfilming engineering documents on 35mm film and a similar specification for drawings and related documents on 105mm were drafted.

The first document in its present form contains 28 pages. It is extremely interesting and well worth analysis. Three basic types of film are specified, namely Type I, silver halide, Type II diazo film and Type III, Kalfax. Ratios of reduction range for sizes from 8½ x 11 to 17 x 22 in either 16X or 20X at the option of the procuring agency; 22 x 34 or 11 x 34 in. 24X; 34 x 44 in. upward to 40 x 50 in. together with 36 and 42 in. rolls (to be rotated when filmed) are to be microfilmed at 30X. Incidentally, the industry representatives at this point interposed objections as the first draft specified 29X for this range of sizes. The finished frame is to be constant 1¼ in. across the width of the film by 1¾ in. centered and parallel to the long edge of the film.

Background density, illumination levels, gamma and image resolution

(*continued on page* 72)

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SUNDAY, AUGUST 7, 1960

10:00 AM Industrial Division Pre-Council Meeting—PDR 3
2:00— 7:00 PM Trade Show—North and South Exhibition Halls
3:00— 5:00 PM Roundtable Discussions, David B. Eisendrath, Jr., Brooklyn, N. Y., Moderator—PDR 3
9:00 PM Percy Butler, FIBP, and Stanley Kenyon, FIBP, Institute of British Photographers—Grand Ballroom

MONDAY, AUGUST 8, 1960

Ed Paeltz, Chairman

8:00— 9:00 AM Continental Breakfast—Sponsored by Carl Zeiss, Inc.—Williford B
9:00— 9:30 AM "Keynoter"—Carolyn Carter, M. Photog., New York City—Williford B
9:30—10:15 AM "A Visual Approach to Executive Briefing"—Messrs. Jack Murphy and Larry Straw, United Airlines, Denver, Col.—Williford B
10:30—11:30 AM "The Responsibility of Industries and Universities in Educating Industrial Photographers"—Dr. C. W. Horrell, Southern Illinois University, Carbondale, Ill—Williford B
11:30—12:30 PM "Department Management"—H. Wilson Maglidt, Sandia Corp., Tibuquerque, N. M.—Williford B
2:00— 4:00 PM "New Products"—David B. Eisendrath, Jr., Brooklyn, N. Y., PMI—Williford B
4:00— 6:00 PM Industrial Roundtables, David B. Eisendrath, Jr., Brooklyn, N. Y., Chairman—Williford B, PDR 12, PDR 13, PDR 14
8:00—11:00 PM Motion Picture Clinic—David B. Eisendrath, Jr., Brooklyn, N. Y., Chairman—Williford B
9:00—11:00 PM Arnold Newman, New York, N. Y.—Grand Ballroom

TUESDAY, AUGUST 9, 1960

Dick Kinstler, Cr. Photog., Chairman

8:00— 9:00 AM Continental Breakfast—Sponsored by PMI—Williford B
9:00— 9:45 AM "Effective Use of Color"—Don S. Lidikay, Union Pacific Railway, Los Angeles—Williford B
9:45—10:45 AM "Any One for Color?"—Jack L. Allsup, A. E. Staley Mfg. Co., Decatur, Ill.—Williford B
11:00—12:00 NOON "High-Speed Photography"—Mort Sultanoff, Aberdeen Proving Grounds, Md.—Williford B
1:45— 2:30 PM "Another Look at Training Films"—Dr. John Mercer, Southern Illinois University, Carbondale, Ill.—Williford B
2:30— 3:30 PM "Photographic Facility Planning"—Bob Heeb, Procter & Gamble. Cincinnati, Ohio—Williford B
3:30— 4:30 PM "Medical and Biological Photography Panel"—Vernon Taylor, Dept. of Health, Education & Welfare, National Institutes of Health, Bethesda, Md.—Williford B
4:30— 6:00 PM Industrial Roundtables, David B. Eisendrath, Jr., Brooklyn, Chairman—Williford B, PDR 3, PDR 4
9:00—11:00 PM "The Photographer in Space"—The Importance of the Photographer and Photography to our Missiles, Rocketry and Space Exploration Programs.—Joseph Snyder, Cr. Photog., Color Corporation of America, Tampa, Fla., Chairman—Joe Rowland, Martin Company; Carl Brewster, Space Technology Laboratories; Major Jim Reid, Cape Canaveral—Grand Ballroom

WEDNESDAY, AUGUST 10, 1960

Ed Purrington, Cr. Photog., Chairman

8:00— 9:00 AM Continental Breakfast—Sponsored by Nikon—Williford B
9:00— 9:45 AM "The Use of Photography in Time and Motion Study"—Prof. B. W. Niebel, Penn. State University, Pa.—Williford B
9:45—10:30 AM "Photography of Large Equipment"—Michael Durante, M. Photog., Allis Chalmers Mfg., Milwaukee—Williford B
10:45—11:30 AM "Photomacrography and Its Application in the Aluminum Industry"—Chas. D. Phelan, Aluminium Laboratories, Ltd., Kingston, Ontario—Williford B
11.30—12:15 PM "Internal Photography, Sewer Inspection, Recording and Surveying"—Malcolm Werenoff, Randolph, Mass.—Williford B
2:00— 4:30 PM Small Camera Clinic—"Telling the Story in Pictures — Utilizing the Small Camera"—Moderated by Rudolph J. Guttosch, Chicago, Illinois. Bob Boyd, The Milwaukee Journal; Myles DeRussy, Kranzten Studio, Chicago; Robert O. Elmore, Wesley Bowman Studio, Chicago—Grand Ballroom
4:30— 6:00 PM Industrial Roundtables, David B. Eisendrath, Jr., Brooklyn, Chairman—Williford B, PDR 3, PDR 12
5:30 PM Masters Reception—Astoria Room—$3.00
7:30 PM Awards Banquet—Grand Ballroom—$7.00

THURSDAY, AUGUST 11, 1960

Jim Hampson, M. Photog., Chairman

8:00— 9:00 AM Continental Breakfast—Sponsored by duPont Co.—Waldorf Room
9:00— 9:45 AM "Available Light Photography"—Ross Sanddal, Hughes Tool Co. and Jack Feltz, Trunk Line Gas Co., Houston, Texas — Waldorf Room
9:45—10:30 AM "A New Look into Color Vision Theory"—Peter Jowise, Lafayette, California—Waldorf Room
10:45—12:15 PM "Unique New Kinds of Slide Shows"—Norman E. Salmons, Eastman Kodak Co., Rochester—Waldorf Room
1:00— 2:30 PM Industrial Luncheon—$3.75. Earl Stanton, Kenmore, N. Y., Presiding—Astoria Room
2:45— 4:45 PM "Tools, Methods and Techniques Forum"—Jim Hampson, M. Photog. Arkansas Fuel Oil, Shreveport, La.—Waldorf Room
4:00— 6:00 PM Industrial Roundtables, David B. Eisendrath, Jr., Chairman — Waldorf Room, PDR 1, PDR 3

FRIDAY, AUGUST 12, 1960

Tom Holberton, Chairman

8:00— 9:00 AM Continental Breakfast—Waldorf Room
9:00— 9:45 AM "Overhead Projection" — Coleman Alfred, Third Army — Waldorf Room
9:45—12:00 NOON "8mm Sound Film in Industry"—Allie C. Peed, Eastman Kodak Co., Rochester, N. Y., Moderator; Allen Hilliard, Geo. W. Colburn Laboratories, Inc., Chicago, Ill. and others—Waldorf Room

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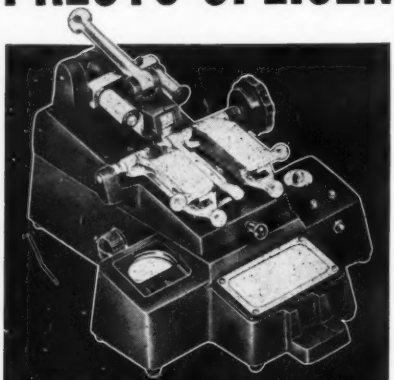

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MICROREPRODUCTION

(*continued from page 70*)

are spelled out in detail. In connection with the resolution requirement, the National Bureau of Standards resolution test diagram is specified.

(Note: The measurement of resolution is by no means the exact art it should be or is it one on which general agreement can easily be reached. The NBS test pattern or diagram, a five line pattern has been criticized by some on the ground that it provides a false indication or reading of resolution under certain conditions. A four line pattern has been proposed but as yet has not been accepted or even widely discussed. The whole subject is controversial and requires additional study and perhaps some future comment in this column.)

The statement on technical quality is so well drafted that it could well (with slight modification to meet individual needs) become a part of any specification for the production of microfilm. It reads as follows: "Each frame of microfilm shall be so exposed and processed that every line and character on the drawing shall be transferred to the film in its entirety and with sufficient clarity to maintain reproducibility through two film and one paper print generation." Of equal significance are the requirements on sequence of frame, placement, targeting and indexing. The use of after treatments or protective coatings is visualized.

Underlying the microfilming specifications are those embodied in an "Interim Federal Specification" for raw stock of various types which are being prepared as part of the program. Dye backing for negative, Type 1, or antihalation backing for speed ratings, resolution, physical dimensions and base density are covered. Diazo films are classified as Type 1, black line, Class A low contrast; Class B, high contrast; Type 2, sepia line, Class C high contrast. Physical dimensions, initial values, a maximum density and maximum burnout density, opacity, transmission, gamma and contrast are covered. Heat developing films (Kalfax) are classified according to film thickness as, Class A, 2 mil base; Class B, 3 mil base; Class C, 5 mil base. Further detailed requirements for physical dimensions, resolution, minimum and maximum density, gamma and speed rating are stated.

All individuals and organizations involved in the production of microfilm must, in the course of time, become completely familiar with these specifications, for the volume of ma-

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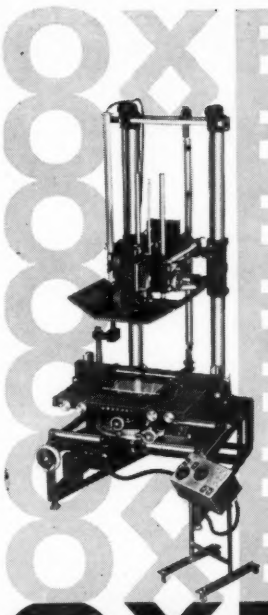
terial used by the Department of Defense is so great that manufacturers will be forced to concentrate on production in these categories. Quite probably the manifest advantages will outweigh some foreseeable disadvantages in this long forward step toward standardization in a field not known for meticulous uniformity in the past.

Machine handling of microfilmed plans is covered in another section of the EDMS program. A specification for "Formats and Coding of Tabulating and Aperture Cards" has also been drafted. Five aperture cards intended to facilitate the exchange of data between services have been developed.

The specifications point up the need for a measure of applicable equipment standardization. A study has been begun to establish the minimum design and performance requirements for the equipment necessary to carry out the program. The objectives include investigation of the suitability of existing equipment, an analysis of total requirements and the preparation of specifications, standards and handbooks for acceptable equipment. A series of investigations will be completed and reported over the next two years.

The "Military Standard" activity representing as it does the needs reflected by the increasing use of microreproduction within the armed services is a boon to the entire industry. By taking the lead in a large and important segment of the field, the Military Standardization group will realize benefits that will assuredly spread to other sections and applications. It should be stressed that the developments herein reported are not as yet fully completed. Final agreement on some at least will be achieved in the relatively near future. When this is done copies of the several documents will be available to contractors from the usual sources, and to others through the Superintendent of Documents. Copies of existing drafts in limited supply could probably be obtained from the Headquarters, Air Materiel Command, USAF, Attention: MCSIFA, Wright Patterson AFB, Ohio.

A full description of the program from which some of the above data were obtained was given at the recent National Microfilm Association Convention held in New York. The papers were abstracted in *Filmsort Facts* (Vol. III, No. 4; April, 1960 Filmsort Div. 3M, 900 Bush Ave., St. Paul, Minn.) and the full texts appear in NMA *Proceeding IX*, 1960. (National Microfilm Association, P.O. Box 200, Annapolis, Md.)



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F.Y.I.

(*continued from page* 8)

you feel like taking advantage of this appetizing offer, contact Mario Trombone, the PR man, 250 West 43rd Street, New York.

Do you have any handy hints or gadgets that you have developed and wish to share with your fellow artists? Jim Hampson of Arkansas Fuel and David B. Eisendrath, Jr. of PMI are conducting a tools and method forum at the Industrial Conference in Chicago. This is the famed audience-participation show in which everyone comes away richer . . . in knowledge shared and gained. If you have any device, method or new angle, come to Chicago and bring it with you.

Industrial motion pictures suffered a great loss when Jay Gordon, Motion Picture supervisor at North American Aviation died suddenly. Ironically, his passing came the day before the IFPA convention in Los Angeles, an organization in which he played a leading part.

Ed Purrington, former head of Ford photographic section, is now executive vice-president of Meteor Photographic, a custom lab specializing in color work. Before joining Ford in 1946, he was in the Navy and with *Life* before the service.

S.O.S. Cinema Supply is now handling the M-H Professional Viewfinder. Custom-designed for Auricon, Bell & Howell, Bolex and Cine Special 16mm cameras, it provides a 2 x 3-in. image corrected from right to left. The cameraman can shoot with both eyes open. For details check with S.O.S. Cinema Supply at 602 West 52nd Street, New York 19, N. Y.

Capital Film Labs has opened a New York office in the Paramount Building on Times Square. Walter Lynch is the man in charge. His address: 1501 Broadway, New York 36, N. Y.

If you are in England and need a Birns and Sawyer heater barney or other B & S item, see G. B.—Kalee Division of Rank Precision Industries. Under a recent agreement announced by Jack Birns, this branch of the J. Arthur Rank Organization will handle Birns and Sawyer products in England and the Commonwealth.

New officers of Photographers in Industry (Greater Pittsburgh) include: President, George R. Poellot, Universal-Cyclops Steel; Vice-President, Albert Levin, University of Pittsburgh; 1st Secretary John C. Stewart, Jones & Laughlin; 2nd Secretary, Ted Varner, Weirton Steel;

Treasurer, Robert L. Cooper, Pittsburgh Plate Glass; Historian, Gilbert B. Arnold, Mellon Institute. The Board of Directors includes Walter V. Beaver, Allis-Chalmers; Duane G. Banks, U. S. Bureau of Mines; Fred C. Baureis, Crucible Steel; Taylor H. Beech, McGraw Edison.

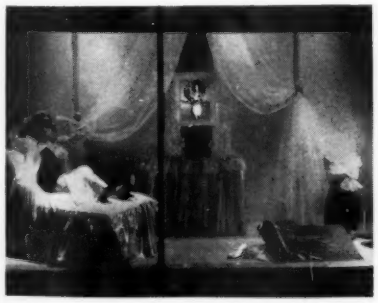
Legal History, Precedent Department: a municipal judge ruled that the husband must pay for the wedding photos, even though the marriage only lasted two months. Silver lining note: if husband pays, he gets the pictures. To tear up?

A firm foundation

Seeing is not only believing but it is also selling. Typical of the displays which combine eye-appeal and sales-appeal is this one at the Broadway department store in Hollywood. This display had so much appeal, in fact, that on one occasion, police had to ask that the window be darkened to disperse the huge crowd gathered in front of the store.

Designed to promote foundation garments by Olga of Hollywood, the set actually serves to draw the attention of passers by to the slide display set into the mirror of the dressing table. The slides are projected by a *Selectrovision* automatic slide projector.

Made by Spindler and Sauppe, Los Angeles, this is a self-contained slide show which can be used with or without sound equipment. It incorporates a 24 x 16 in. plastic nonreflecting screen and has a 3-in. f/2.8 projection lens. The basic component of this unit is the *Selectroslide* equipment, an automatic slide projector, originated by Spindler and Sauppe over 35 years ago.



The cabinet folds down to 28½ x 10 x 56 in. for shipment. It can be used alone or mounted on a table.

Once more, photography provided a firm foundation for increased sales.

Final reminder! PMI breakfast for Industrial Division of P.P.ofA. at the Conrad Hilton, Chicago; Wednesday, August 10. Everyone invited.

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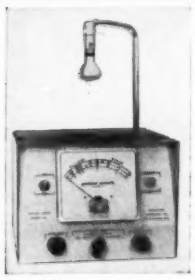

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INTEGRATED A-V

(*continued from page 50*)

jection booth – completely treated acoustically–features the projection set-up. Complete stage and decorative auditorium lighting is available with switchboard control to obtain an infinite number of lighting effects and combinations for any type of stage production.

The opening of the stage inside the proscenium arch is 22½ ft. high and 44 ft. wide. The stage has a disappearing lectern. An inter-auditorium communication system from stage to projection booth and control booth at the rear of the auditorium is available.

Other facilities in connection with staging include a completely equipped loft space, two tiers of dressing rooms, a prop room, and a radio control room. In addition, separate from the auditorium but directly connected to it by a passageway, are complete prop and scenery construction facilities. A screen 11 ft. high by 30 ft. long can be masked for any proportions from standard to Cinerama.

A-V equipment includes: One Bell & Howell carbon arc 16mm movie projector, four Strong carbon arc slide projectors (two for rear projection), two 3000-watt follow spots, one Dimmer control panel with 38 dimmers controlling 60 instruments, sixteen RCA No. 12034 Low Impedance mikes, one RT-11B RCA Professional tape recorder, one PT6 Magnecorder tape machine, two Presto 15-in. turn tables, two Presto 15-in. record cutting tables, one Western Electric 7 input mixing console, one RCA 16 input mixing console with matched hi-fi preamp, and one RCA Variable sound effects filter.

However, even with all the know-how and equipment there are still times when it is best to seek outside services for certain projects. All finished art work is finished by outside individuals or studios, because the time involved does not justify the increased personnel that would be needed to handle it. By going to outside firms variety is also achieved. There are enough members within the section to handle most of the writing assignments but specialists are sometimes called in for special projects.

Film editing which requires special skills and equipment is also done by outside firms. It would not be feasible for Armstrong to invest in expensive equipment and specialized people needed for this highly specialized type of work.

The company also seeks outside help for jobs Special Promotions does not have time to do or does not want to do. For example, a film directed at consumers such as *Decorate For Living*–a movie telling how to decorate homes–was too big a production to be handled internally. It required too many sets and too many skills such as lighting, sound, color and casting.

That is one of the reasons that members of the Special Promotions Section are trained to be producers or directors–so that they will have the managerial skills needed to coordinate outside projects.

What is the procedure involved in carrying out projects?

Special Promotions sets up a yearly schedule about the time budgets for the preceding year are set. The schedule is built around four fixed dates for there are always four sales conventions to be produced and a number of films planned by the Advertising Department. Many other projects arise during the year such as movies and slide films and special promotional projects.

Floor to ceiling A-V

The major projects are sales conventions. The two largest conventions are the Floor and Building Materials Conventions for wholesale distributors of the Armstrong line. These conventions have become famous throughout the trade because of the interesting manner in which they are presented.

"Business managers are interested in business problems and solutions. We work closely with our own company management to present programs that are helpful in providing our distributors an over-all picture of their business, their opportunities, and then help set objectives. That's why our attendance increases every year," Goldstrom says. "While we consider these conventions business meetings, we strive to make them as entertaining as possible by use of skits, films, slides, music, as well as standard graphs and charts."

Work on the convention starts about 10 weeks in advance of the deadline. Moodie and Goldstrom get together with members of the sales staff of the division holding the convention for a preliminary discussion. At about the third meeting, they become specific and start developing an outline. When the outline has been completed, writing assignments are handed out. Some members work with the speakers in preparing their speeches; others work on slides, skits and other

audio-visuals that appear within the speeches. An estimated 400 to 450 slides and 2,000 ft. of film are used for the average convention. About 15 addresses have to be written and the convention book averages about 450 pages. Approximately four weeks before the deadline, rehearsals start. It takes about six weeks for writing, production and rehearsals.

The sales conventions are timed down to the minute and present a highly professional appearance. Even the major speakers rehearse so that the conventions adhere to the schedule. The people attending not only gain useful information which will help them with their business but they are given it in an interesting manner. "We try to pace a two-day meeting by integrating good speech materials with skits, slide presentations, motion pictures and occasional use of music," Goldstrom says. "We are limited in this area only by our own imaginations."

Special Promotions also produces presentations to be carried to wholesalers and retailers in the field — such things as clinics to help them better manage their business. Another project carried out by Special Promotions was a closed circuit television colorcast for architects, builders and decorators. The Section produces 30 films a year and writes speeches and presentations for special meetings members of the organization attend throughout the year.

Keeping up with the times

Special Promotions not only produces movies, strip films and slides for every division of the company, it also keeps them up to date, discarding those that become obsolete and producing replacements. This is a large task in itself considering the fact that there are about 75 movies and strip films available for circulation. The variety of these films is extensive. They include sales training films, product and sales promotion films, how-to films, sales meetings films and technical films.

Goldstrom says an internal group to handle audio-visual needs and special promotions has worked well for Armstrong because the company has been pioneering in the techniques of this field for many years. Although the Special Promotions Section was not formed until 1953, the work had been carried on for many years by other people in the company. Forming a special group for this work has resulted in tighter coordination, more quality, and cost savings.—THE END

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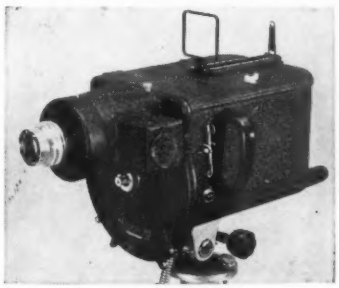

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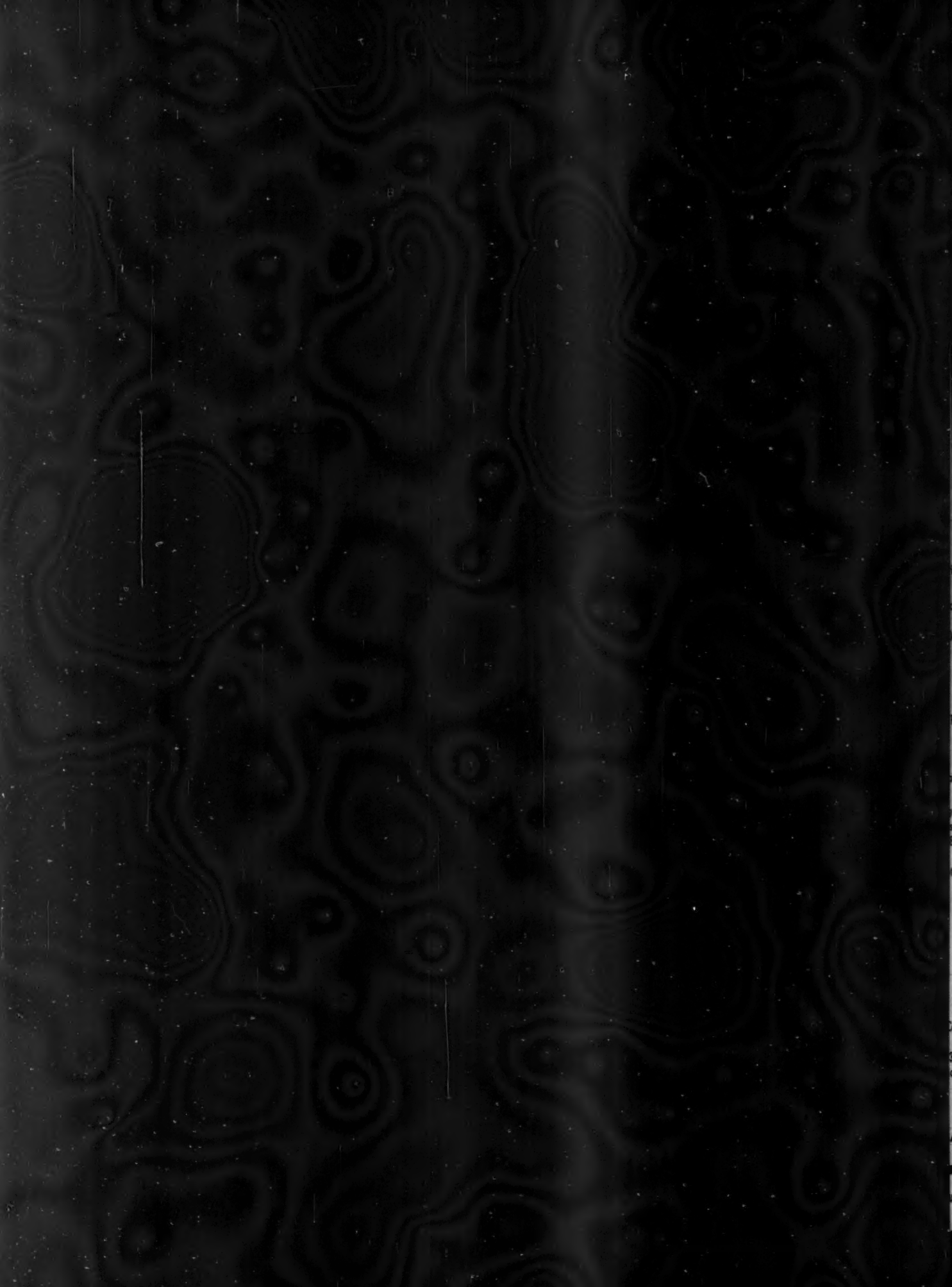

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CARD AT A TIME

(*continued from page 65*)

it for their extensive directories and all three systems have been tried out by the Navy.

The first commercial installation of a Foto-List system was at the Weaver organization in Long Island City, N.Y. Since Weaver is a lithographic organization the cold composition methods were not new, only the camera operator required special training. Dale Yoakum is Weaver's Foto-List expert (trained by Varityper) and he showed us a variety of jobs that are handled with the camera. They ranged from complete telephone directories for neighboring communities, to small inter office phone books and rosters. Malcolm Klein, President at Weaver, says that it is economical to use the Foto-List system for jobs requiring reruns as long as the percentage of corrections is less than 50 per cent. He cited one instance where a job running approximately 400 pages cost the customer $18.75 per page for the first run. The second run cost $7.75 per page and corrections were approximately 15 per cent. He estimated that hot metal costs for the first run would have been $23 per page. The Foto-List costs were for films stripped together ready for platemaking. Most of the in-plant operations considering the use of a card camera system would probably be more interested in speed and efficiency of operation since time *is* money to them.

The Weaver installation is comprised of five Varityper Line Composers, a Pitney Bowes Tickometer (card counting machine) and the Foto-List camera. The card counting machine facilitates page make-up since there are a set number of lines for any specified column depth. The Tickometer is used first to count all the cards in a job in order to determine the proper format and type size. Once these are decided upon the cards are recounted and a spacer card inserted at the end of each column. Folios, headlines and any other material which must appear on the printed page are prepared on cards and inserted in the proper location in the file. The job is now ready for the camera. Since the film is processed manually in standard A and B litho developer, Yoakum usually notches the film between colums at intervals of two or three feet. This is accomplished by a built-in device and the darkroom man can easily feel the notches in the dark so that the roll may be cut apart without fear of cutting through the middle of a column of type.

Pitney Bowes Tickometer

The camera requires approximately 10 x 15 ft. of working space. A separate 110V AC 30 ampere line is recommended in order to minimize voltage fluctuation and insure even exposures. Illumination is provided by four GE mercury vapor lamps each of which can be controlled by a rheostat. The lens, a Goerz f/6.6 Dagor has a focal length of 6 in. Set-up time for a new job is a mere matter of minutes—a set of tables supplied with the camera makes the job a relatively simple one. Leading can be introduced by advancing the film at a faster rate than the cards and underscored lines are produced by closing the shutter mask slightly. The matrix of a form (inked on a glass plate) may be inserted in front of the film plane in order to produce a listing in tabular form. If spacing is desired between items a white spacer card is added to the pile. Headlines which must be stripped in later are handled by using cards pre-printed with a ½-in. border across the top. As the camera films the stack of cards the black cards will provide clear windows in the negative. The number of black cards will determine the size of the window.

The Varityper film used in the camera is an Ortho Type 3 thin-base type which is packaged in a daylight loading box. One hundred foot rolls of a similar film for darkroom loading are available from the leading film manufacturers. Widths of 3¾ in. to 9¾ in. cost from $17 to $40.50 a roll. The autopositive proofing paper is $5 to $9 a roll.

The union has accepted the Foto-List camera system in the Weaver organization. Klein mentioned that the average process cameraman would probably be bored with the simplicity of the automatic camera, furthermore since the camera was installed Weaver has had to hire many more film strippers in order to keep up with the flow of negatives.

Looking towards the future, Klein feels that the system is here to stay and that it efficiently and economically bridges the gap between the composition and platemaking operations for this specialized type of work.—THE END

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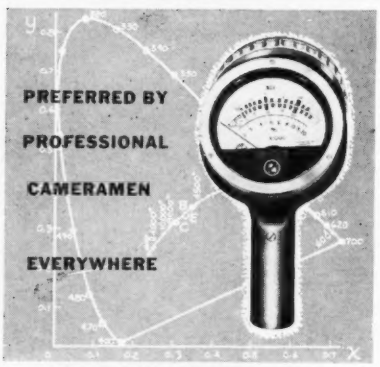

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INSTRUMENTATION

(*continued from page 62*)

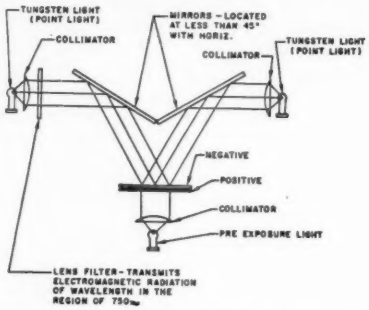


Fig. 2 Dodging by simultaneous exposure to effect curve shift.

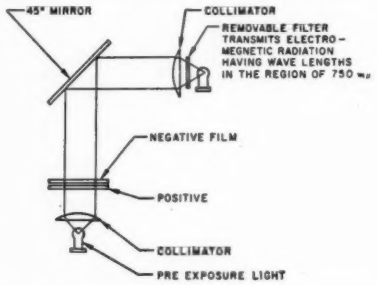


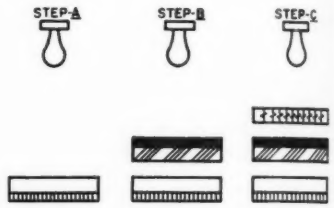
Fig. 3 Automatic dodging using separate exposures, removable filter.

"If an emulsion which has not been dye-sensitized to red or infra-red is exposed to blue light, a latent image will be formed in the normal way. If the emulsion is subsequently exposed to a red or infra-red radiation before it is developed, some of the effect of the original exposure will be erased. Thus, the long wave length radiation is capable of destroying, to some extent, the latent image formed by white light."

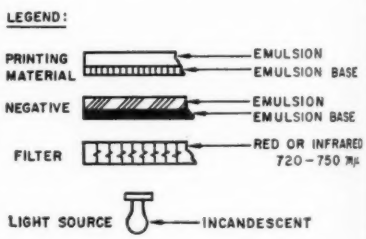
Further tests were made using paper emulsions with a high bromide content. Improved results were obtained. It was further felt that the use of a filter transmitting radiation having wavelengths in the 720 to 750 millimicron range would provide the maximum Herschel Effect.

Continued research has led to changes in the original concept. Erasure is now accomplished by other means that infra-red radiation to avoid excessive heating. Printing stock is being uniformly pre-exposed to provide better control. Filters with transmission characteristics in the 720-750 millimicron range are being investigated to determine the exact wavelength which will produce the maximum effect.

Although this system of automatic dodging is still being tested, enough data has been gathered to indicate its potential importance. This method is expected to provide reliability, high production rates, ease of maintenance (compared with electronic systems) and savings in costs per printer.—THE END



Automatic dodging using multiple exposures, one with white light, second with red, infra-red filter.



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FREE LITERATURE

For your copy of any free literature item, circle the appropriate number on the reader's service card, attached, page 85.

AUDIO-VISUAL

SLIDEFILM PROJECTOR 201
McClure Projectors, Inc. Illustrated specification sheet gives data and describes operation of the McClure Picturephone sound slidefilm projector.

3-D TITLES 202
The Joseph Struhl Co. 6-page illustrated brochure describes the three-dimensional and live action titles offered by Struhl.

REPEATER PROJECTOR 203
Sound Masters, Inc. Illustrated folder describes the uses and gives the specifications for the S/M Repeater projector.

CARBON ARC SLIDE PROJECTOR 204
The Strong Electric Corp. Illustrated brochure describes and gives specifications of a carbon arc projector for 3¼ x 4 and 2 x 2 slides.

PROFESSIONAL LETTERING 205
Variagraph Co. 38-page illustrated catalog shows type faces and lettering accessories.

SALES PROJECTOR 206
Sales Projectors, Inc. 4-page illustrated folder describes and gives advantages of the Sales Projector. Includes prices.

GRAPHIC ARTS

OFFSET PLATES 225
The Gevaert Co. of America, Inc. 20-page booklet, *The Gevacopy Offset Rapid Process*, describes the technique of producing inexpensive aluminum offset plates.

MICROFILM FILING 226
NB Jackets Corp. Specification sheet gives information on the NB automatic filler which inserts microfilm in notched jackets and File Shrinkers which combine the features of unitized microfilm and vertical files.

MICROFILM PRINTER-PROCESSOR 227
Kalvar Corp. 4-page illustrated folder gives specifications and features of the Kalfax Microfilm Printer-Processor. Also lists other Kalfax film products.

BALL POINTS THAT COPY 228
Minnesota Mining and Mfg. Co. 16-page booklet, *Ball Point Pens for Use with Thermo-Fax Copying Products*, lists over 150 ball point and liquid graphite pens rated according to their ability to give good reproduction when used with any Thermo-Fax copying machine.

ELECTRONIC PRINTING 229
Rex Rotary Distributing Corp. 8-page folder, illustrated in color, gives brief description of Electro-Rex stencil reproducer and Rex-Rotary D 280 printer.

CAMERA & LENS

CALUMET VIEW CAMERA 207
Calumet Mfg. Co. Illustrated folder gives specifications for the Calumet 8 x 10 all metal view camera. Lists accessories and prices.

CAMERZ SYSTEM 208
Photo-Control Corp. Catalog sheet gives specifications and lists features of the Camerz System of long roll film cameras, magazines and accessories.

FAST PULSE CAMERA 209
Chadwick-Helmuth Co. Illustrated specification sheet describes the 16mm Pulse Camera Model 370. Also describes its application in slow-motion movies of destructive resonances in vibration tests.

(*continued on page* 82)

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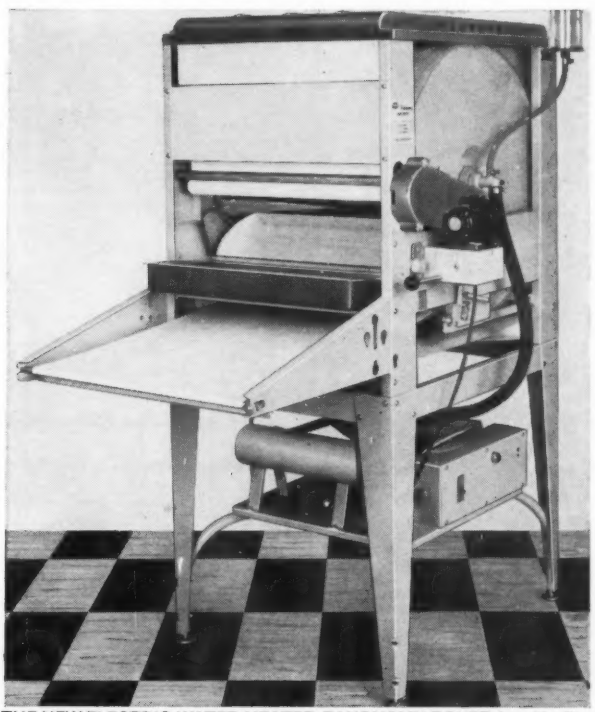

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SCIENCE CATALOG 210
Edmund Scientific Co. 128-page illustrated catalog lists telescopes and accessories, microscopes, lenses, prisms, wedges, aerial cameras and lenses, etc. Includes prices.

VIDEO FILM RECORDING 211
Bach Auricon, Inc. 4-page illustrated brochure describes the VFR method of recording closed-circuit TV picture and sound for future reference.

SERVICES

CUSTOM COLOR LAB 230
Custom Color Laboratory. Wall chart price list also lists services available from this California lab.

PRODUCTION EQUIPMENT
Behrend Cine Corp. 90-page illustrated catalog lists professional production equipment available from this company including cameras, recorders, sound and lighting equipment, editing and screening room equipment, cutting room supplies and animation equipment. Includes prices. Send request on company letterhead.

EKTACOLOR PRINTS 240
Keith Cole Color Labs. 4-page wallet sized folder gives exposure indexes and guide numbers to use when shooting with Ektacolor Type L, Ektacolor Type S or Kodacolor under tungsten or fluorescent lighting.

COLOR REPRODUCTION 241
Color Corp. of America. 4-page illustrated reprint from *Print* magazine, *Is True Color Reproduction Possible*, by Lloyd E. Varden.

PRICE SCHEDULE 242
P.I.C. Color Corp. 3-page price schedule also lists services available from this New York firm.

LAB PLANNING 243
Rolor Industrial Corp. 8-page illustrated booklet, *Planning a Lab?*, gives information on building a new photo lab or remodeling an old one.

MOTION PICTURES

MITCHELL R-35 230
Mitchell Camera Corp. Specification sheet lists all features and data on the new Mitchell R-35 portable reflex studio camera. Includes prices.

SPRAY PROCESSING 231
Hi-Speed Equipment, Inc. Catalog sheet gives specifications for the Hi-Speed FA-50 spray developing machine. Includes diagram of space required for unit.

MITCHELL 16 232
Mitchell Camera Corp. 16-page illustrated brochure gives complete information on the Mitchell 16 motion picture camera. Lists accessories.

PRESTO-SPLICER 233
Prestoseal Mfg. Corp. Illustrated specification sheet gives technical information on the Presto-Splicer. Also lists some of its applications. Includes prices.

SOUND CAMERA 234
Bach Auricon, Inc. 6-page illustrated brochure describes the Auricon Sound Camera and lists some of its applications in business.

16MM VIEWFINDER 235
S.O.S. Cinema Supply Corp. 8-page illustrated folder gives specifications for the M-H Professional 16mm viewfinder. Also lists accessories and prices.

OPTICAL COLOR PRINTER 236
Sickles Sales and Service Co. Illustrated catalog sheet gives specifications for the Emby-Homrich 35mm optical printer for positive or negative color.

PIXIEOLA 237
Camera Equipment Co., Inc. Illustrated reprint from *Telefilm* magazine, *Meet Pixieola*, describes and gives specifications for the CECO film inspection, re-editing unit.

SUPPLIES

CHEMICALS 244
Clayton Chemical Co. 8-page illustrated folder describes Clayton P-60 fine grain film developer, P-20 universal developer and CF-9 speed fixer for films and papers.

SOLVENT FILM CLEANER 245
Computer Measurements Co. 4-page illustrated folder gives complete data on the Unicorn Solvent Film Cleaner designed for use in processing laboratories. Includes a cutaway diagram of the unit.

PHOTO PRODUCTS 246
Yankee Photo Products. 6-page catalog lists photo products carried by this company including slide trays and accessories, slide viewers and developing and printing accessories.

PHOTO BOOK CATALOG 247
Amphoto. 26-page catalog of photographic books includes subject and title indexes.

BOOKLET ON BULBS 248
Westinghouse Electric Corp. 8-page illustrated booklet, *Quick As a Flash*, explains how to select the proper bulb to get the best results. It also contains a flashbulb and exposure guide and a description of each type of flashbulb.

DATA CHARTS 249
Cormac Chemical Corp. Set of seven charts gives data on film processing with Unibath CC-1 and CC-2. Includes charts for Panatomix-X, Royal-X Pan, Verichrome Pan, Super Panchro-Press Type "B", Plus-X Pan, Royal Pan and Tri-X Pan.

MICROFILM PROCESSING 250
Cormac Chemical Corp. 10-page report on the Unibath CC-7 method for controlled microfilm processing. Covers among other things, temperature range, image stability and results of field tests.

NEW IN LIGHTING 251
General Electric, 4-page illustrated booklet, *What's New in Photo Lamps and Lighting*, includes AG-1 slave unit design for do-it-yourselfers.

EQUIPMENT

MASKING ATTACHMENT 212
Simmon Brothers, Inc. Specification sheet describes and gives operating instructions for the new Simmon Omega masking attachment. Includes prices.

COLOR DENSI-METER 213
Lektra Laboratories, Inc. Catalog sheet describes and gives specifications for the Color Densi-Meter Model PTM-8. Includes prices.

STEEL EQUIPMENT 214
Smith System Mfg. Co. 8-page illustrated catalog describes various storage cabinets and stands manufactured by this company. Includes prices.

STARLITER SPEEDLIGHTS 215
Scheibe Engineering, Inc. 4-page illustrated folder describes the Golden Starliter 200 and the Starliter 100. Also lists accessories and prices.

DECADE INTERVAL TIMER 219
Lektra Laboratories, Inc. Illustrated catalog sheet gives specifications for the Electronic Decade Interval Timer Model TM-8. Includes prices.

DELAY TIMER 220
S.O.S. Cinema Supply Corp. Illustrated catalog sheet gives specifications for the S.O.S. Lectronotch delay timer which can be used on both optical and contact printers. Includes price.

(*continued on page* 84)

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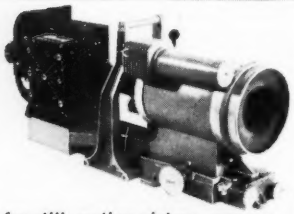

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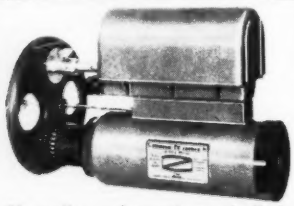

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ELECTRONIC FLASH 216
Hershey Mfg. Co. Illustrated catalog sheet gives specifications for the Hi-Pro 75 electronic flash. Includes chart listing guide numbers for ASA film speeds.

EF EXPOSURE METER 217
Hershey Mfg. Co. Illustrated catalog sheet gives specifications for the Sun Lite exposure meter for use exclusively with electronic flash units.

INDUSTRIAL TRIPODS 218
Quick-Set, Inc. Illustrated catalog sheet gives specifications for the Gibraltar industrial tripods. Includes accessories and prices.

AUTOMATIC SPLICER 221
Computer Measurements Co. Illustrated specification sheet gives complete description and data on the Unicorn automatic film splicer.

PROFESSIONAL TRIPODS 222
Quick-Set, Inc. 4-page illustrated folder gives specifications for Samson professional tripods. Includes accessories and prices.

TRIPOD SCREENS 223
Radiant Mfg. Corp. 4-page illustrated folder lists projection screens available from this company.

SILVER RECOVERY 224
Hi-Speed Equipment, Inc. 4-page illustrated brochure gives facts on silver recovery, describes two recovery units and shows diagram of typical system layout.

PRINT DRYERS 252
Photo Materials Co. Catalog sheet for Premier thermostatic print dryers, flat and rotary types.

HEICO FILTRATION 253
Heico, Inc. 8-page pamphlet *How Much Does Dirty Water Cost You?* gives advantages of Herco's MIK multi-stage filtration units.

AUTOMATIC PRINTERS 254
American Photographic Appliance Corp. 12-page illustrated catalog for the APAC line of automatic projection printers, roll paper easel, automatic contact printer and other rapid printing aids.

SMITH-VICTOR LIGHTS 255
Smith-Victor Corp. 8-page catalog of lights and light stands for still and motion picture use. Includes prices.

PROCESSING EQUIPMENT 256
Industrial Timer Corp. 8-page catalog of darkroom and processing equipment includes: gas burst systems, burst plenums, signalling timers, temperature mixing valve, stainless steel tanks.

LOWEL LIGHTS 257
Photo Engineering. Catalog sheet describes the Lowel Light Kit for motion picture and still photography.

WELCH DENSICHRON 258
W. M. Welch Scientific Co. 4-page pamphlet describes color balancing and exposure of positive color material using the Welch Densichron.

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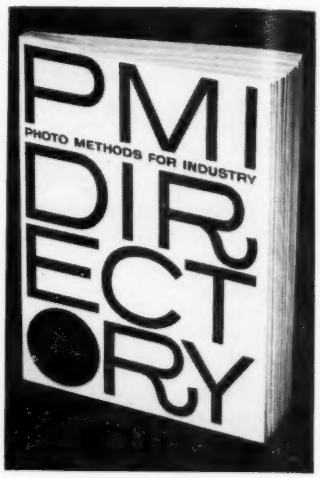

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NEW PRODUCTS

For additional information on any new product circle the appropriate number on the readers' service card, page 85.

PROJECTO EDITOR **101**
The HFC Projecto Editor, manufactured by the Hollywood Film Co., is a portable, self-contained 35mm projector with an intermittent movement. It uses a 1000-watt incandescent lamp and can run 3000-ft. 35mm composite prints as well as separate picture and optical or magnetic sound tracks in synchronization for checking dailies.

Additional features are: 30-watt amplifier; runs forward and reverse at standard speed, variable speed foot control for single frame inspection; heat filters; tilting device to raise or lower the projector; storage area for magazine during shipment. The editor is 18 x 29 x 50 in. and weighs 275 lbs. Price: $2395 f.o.b. Hollywood.

WINDMAKER **102**
A new Moleffect, the Windmaker, has been announced by Mole-Richardson Co. The Windmaker was designed for use in Hollywood studios and is said to produce maximum air flow with minimum noise. The air stream is directional with vanes or broad without vanes. It operates on 120-volt AC or DC and a rheostat control provides smooth, variable speed. The Windmaker sits on the floor or mounts on a pedestal and tilts or pans 360°. Price: $492 plus packing f.o.b. Hollywood, Calif.

DIAZO COPYING MACHINE **103**
The Copyflex Model 120 diazo copying machine for office use has been introduced by the Charles Bruning Co. The machine copies translucent and semi-translucent one-sided originals at approximately 1¼¢ per copy.

DARKROOM SAFELIGHTS **104**
Darkroom safelights in nine sizes are now being manufactured by the nuArc Co., Inc. All safelights have a metal body with silver, baked enamel hammerloid finish and special sizes can be made to order.

THE CAMERZ SYSTEM **105**
The Camerz System of long roll film cameras, magazines and accessories is announced by Photo-Control Corp. The system provides Camerz Model 10, a positive locked, fixed focus camera adjustable from 40 in. to infinity and parallax corrected. The Model 10 is available with 103mm and 127mm lenses. Camerz Model 20 is said to feature rapid focusing, automatic parallax correction and 127mm, 162mm and 190mm lenses. Reflex or eye level viewing, as well as a ground glass panel, are available on both models.

Camerz magazines are available for 35, 46, 52 and 70mm perforated or unperforated film and come in 100- and 200-ft. sizes.

Cameras and magazines are of aluminum construction and have leather-like grey exterior finish.

"SUN-LITE SUNRING" **106**
A miniaturized electronic flash unit, the "Sun-Lite Sunring," has been announced by Hershey Mfg. Co. The ring-type light was designed for use in detailed close-up photography on an around-the-lens installation. The unit operates from 110-volt, 60-cycle AC outlet (single phase), and has a 6-ft. detachable line cord. Synchronization is "X" or "O" delay only with 1/1300 sec. flash duration and 5-sec. recycling. Power rating is said to be 50 watt-seconds with 6500° Kelvin color temperature. Price: $77.50; power pack, $34.95.

TWIN SURFACE DRYER **107**
The Premier 1800 dryer, manufactured by Photo Materials Co., has a constant tension device on both canvas aprons, said to assure wrinkle and spot free drying on the twin surfaces. The unit has a total drying surface of 37 x 24 in. It mounts on

(*continued on page* 88)

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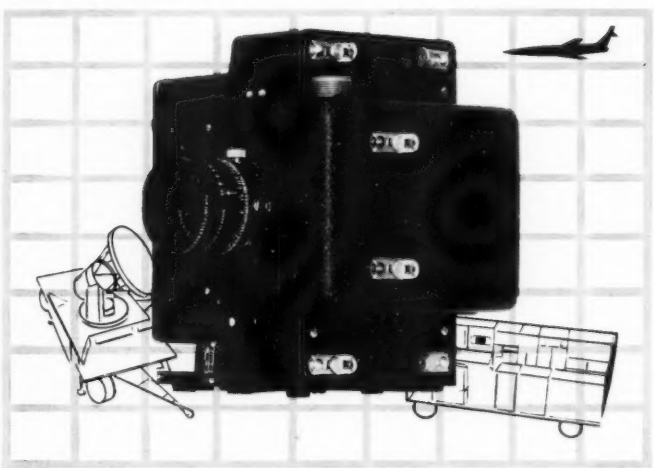

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NEW PRODUCTS

(*continued from page 87*)

either bench or wall and has indexed stops so that the operator has control of the rotation at all times. A drying capacity of approximately 600 4 x 5 prints per hour is claimed.

PROCESS CAMERA **108**
Process Cameras & Equipment, Inc. has announced a 12 x 15-in. camera for use with camera speed paper negative for reducing or enlarging. Designated the Clydesdale Process Camera 12 x 15, the unit has a copyboard size of 21 x 25 in., a film area of 15 x 15 in., reduction of 4½X and enlargement 3X. It requires 24 x 72 in. of floor space and operates on 110-volt AC. Price: $289.

35MM MICROFILM SPLICER **109**
A 35mm microfilm splicer which uses Mylar tape has been announced by Hudson Photographic Industries. The splicer utilizes a pre-cut, adhesive coated Mylar tape said to form a transparent, permanent butt-type splice. The HPI Micro-Film splicer is constructed of die cast aluminum with stainless steel cutting blades and film alignment pins. Price: $14.50, 35mm Quik Splice Micro-Film tape $2.50 per package.

CAMART TIGHTWIND **110**
Camera Mart has introduced the Camart Tightwind adapter which, it is claimed, will wind your film smoothly and evenly without abrasions. It was designed to fit 16 or 35mm standard rewind and operates on a ball bearing roller. Price: $34.95.

MIRANDA "D" **111**
The Miranda "D" imported by Allied Impex Corp., features a Soligor-Miranda f/2.8 pre-set lens and shutter speeds from 1 sec. to 1/500 sec. It has an interchangeable lens mount to take 136 Miranda, Exakta and Praktica lenses and accessories, as well as a wide range of other popular-make lenses. Other features are an instant-return mirror, an eye-level pentaprism, rapid wind lever and full flash sync. Price: $119.95; leather eveready case, $14.95.

AERIAL EXPOSURE COMPUTER **112**
A two-dial computer to help aerial photographers establish correct exposure has been published by Eastman Kodak Co. The unit is contained in a 6-page folder which includes instructions and examples of typical exposure problems. Price: $2.50.

POLYCHROME OFFSET PLATE **138**
Speedkote is an aluminum manganese alloy offset plate recently announced by the Polychrome Corp. Both sides of the plate are presensitized, providing two printing surfaces, with a chemically grained effect. Processing the Speedkote plate is done with a new one-step chemical called Quick Step developing lacquer. The substance is wiped over the entire surface of the plate after exposure in the vacuum frame and the plate is then said to be ready for running on the press.

SYNCHRONIZER TESTER **113**
A new unit which tests synchronization through a range of 0 to 50 milliseconds is the Model 205 Synchronizer Tester manufactured by Aerotronic Associates, Provision is made for internal and external synch. Price: $110.

64 OZ. GRADUATE **115**
Leedal Inc. recently added a 64 oz. stainless steel graduate measure to its line of darkroom equipment. Price: $11.50.

5000-WATT-SECONDS FLASH UNIT **116**
The Clive Courtenay Co. Ltd. Model 5000 recently introduced by Electrolabs has a maximum output of 5000-watt-seconds. Power requirements are 110-120V AC, 60 cycles. Up to five flashheads may be used with this model.

ALKALINE PENLITE BATTERY **117**
A new penlite size Eveready alkaline Energizer is said to have a service life 10 times that of a standard penlite cell at 2.25 ohm continuous drain; 7 times at 4 ohm and 11 times at 1 ohm continuous drain.

11 X 14 BROWN CAMERA **118**
A new horizontal process camera, the Escort, has been added to the Brown Mfg. line of graphic arts equipment. The camera is equipped with a 9¾-in. lens, automatic diaphragm control, glass covered copyboard, pressure back built-in lights, 120-sec. timer and re-set device. A 2X enlargement and reduction is possible with this unit.

ANSCO REPROLINE FILM **119**
A new film for line work has recently been introduced by Ansco. The Reproline film is said to have a thin (.0045 in.), clear, high transmission base.

CONVERSION FILTER SHEETS **120**
Rosco Laboratories, Inc. have announced the Roscolene MT 2 filters which are said to be comparable to the Wratten No. 85 and No. 86 filter and are used to convert daylight (6000K) to 3200 K. Price: 85¢ for 20 x 24-in. sheet, $25.00 for 42-in. X 42-ft. roll.

ULTRASONIC POLYESTER SPLICER **121**
A high-frequency mechanical vibration created by the Ultrasonics splicer joins polyester film, tape and sheet without the use of heat or adhesives. The equipment has been used with material up to 6 mils thick according to the manufacturer and greater thicknesses can be accommodated, the manufacturer states. Price: $600 to $900, depending on the application.

MAGNETIC PLAYBACK UNIT **135**
A magnetic playback unit for Kodak Pageant Sound projectors has been added to the line of magnetic playback units manufactured by Greg. This new unit will permit current Optical Sound Projectors to reproduce Magnetic Sound Tracks on 16mm film in accordance with SMPTE standards, it is said. A three position switch permits playing optical sound tracks, magnetic sound tracks or optical and magnetic sound tracks, simultaneously or mixed.

BAR-PLATE STRIPPING TABLES 125

A wet-negative table and a wet-layout stripping and line-up table have been added to the Bar-Plate line of graphic arts equipment. Both items are available in sizes of 20 x 24 in., 24 x 36 in., 30 x 40 in., and 40 x 52 in. The working surface of satin etched glass is located 28 in. from the light source. Illumination is said to be cool, non-glare and even.

SUPER HYPAN 16MM FILM 126

Ansco Super Hypan film is now available in 16mm size for motion picture use. It is available with standard perforations along both edges and with single perforations, Sound B. For special applications it is also supplied specially perforated for use in high-speed cameras. Price: $4.60 for 100-ft. regular and Sound B, $5.15 for high-speed cameras. The film is available in continuous lengths up to 1200 ft.

MAGNETIC-OPTICAL PROJECTOR 127

An improved model of the Kodak 16mm magnetic-optical sound projector has been announced by Eastman Kodak Co. Its new features over the older model include a film pulldown with tungsten-carbide teeth; a single switch which controls the motor, lamp and forward and reverse film movement; a larger 11 x 6-in. speaker. Price: $850.

HOUSTON FEARLESS PROCESSORS 128

A series of machines for processing Kodachrome or Moviechrome motion picture film and slides has been added to the line of Houston Fearless equipment. Simplified design and automatic controls are said to provide one-man operation. Processing speeds are from 1500 to 3600 fph for 8/16mm film and 300 to 1500 fph for 35mm film.

KINDERMANN SLIDE MOUNTS 129

A new plastic and glass hinged slide mount for 2 x 2 slides has recently been introduced by Walter Voss Inc. Called the Kindermann Super slide mounts, they are packaged 20 to a box.

TYPE 3 KODALITH 137

A high contrast, photomechanical emulsion and a durable stripping base have been combined into Eastman Kodak's new Type 3 Kodalith Transparent Stripping Film. The new film also possesses the unique quality of its predecessor enabling it to be stripped either wet or dry. The emulsion is said to reproduce the entire tone scale from solid pinpoint shadow dots to open pinpoint highlight dots with excellent quality.

GOODKIN SWIVEL-TOP CAMERA 136

A new product that combines a copyboard camera, light table and adjustable 25 x 35-in. drawing board has just been announced by the M. P. Goodkin Co. Known as the Goodkin Swivel-Top Camera this unit requires only 27 x 37 in. of floor space. A 4⅛ x reduction and enlargement range is said to be available. Viewing area is 18 x 23 in. and copyboard is 17⅛ x 22 in.

The unit is said to feature a special adjustment that permits the operator to readily change the angle and work surface of the camera to any position, from vertical to horizontal, that best suits his working comfort. Price: $450.

BC FLASH BOX

(*continued from page* 41)

go on although there is enough energy to operate the flash unit. At lowered voltage levels, about 80 per cent or so, there is a phenomenon known as body capacitance. This manifests itself when the neon light will not go on until you touch it. Then it lights up. This is a sign that the voltage within the unit is down to about 80-85 per cent of normal. On a parallel circuit, the light might work perfectly but every bulb circuit might be inoperative and no one would know until it was too late. (In a series circuit, the power travels in one path from beginning to end; voltage drops but amperage remains the same. In a parallel circuit, there are several paths starting off the main line. Amperage drops but voltage is constant.)

The potentiometer serves to equalize resistance in the circuit which is designed to handle ten bulbs. If ten bulbs are used, the potentiometer is set at zero. Settings are indicated for one, five and ten bulbs. For other numbers, settings are in-between the marked settings. This is not critical; any approximation will provide adequate protection against arcing.

If desired, this unit can be used for remote camera operation by using a solenoid on the camera shutter. The solenoid is plugged into the unit instead of a bulb. When the switch is released, the unit will drive the solenoid and make the exposure. This method will work at distances well over 500 feet.

What's needed to make the box:

3	30-volt batteries (Burgess Y-20 or equivalent)	@	1.85
1	12,000 ohm ½-watt resistor (ohmite)		.14
2	Sockets No. 61-MIP-61F Amphenol	@	.36
1	Capacitor 50 mfd. 150V. Cornell-Dubilier No. BR5015		1.45
1	Neon indicator—Drake No. 110		1.90
1	Potentiometer 50 ohm, 5-watt—Centralab No. ww500		1.90
1	Case 2¼ x 2¼ x 4 in., Bud No. CU-2103 A		1.40
11	G.E. No. 4300-1 Snap-on plugs	@	.12
19	G.E. No. 1017-1 Snap-on sockets	@	.17
1	Edwards No. 71 pendant push switch		1.15

Total List Price: $18.76

Assembly notes

There are four basic steps in putting the box together: making the brackets out of sheet metal; drilling case to accept components; mounting components and wiring the unit.

(*continued on page* 90)

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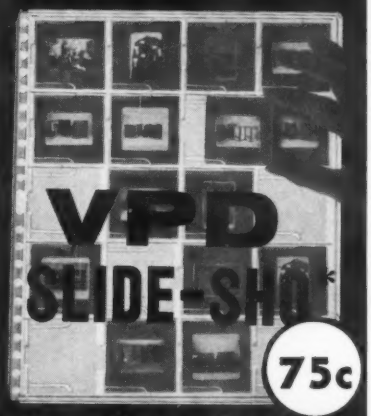

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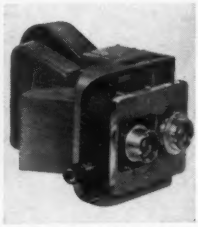

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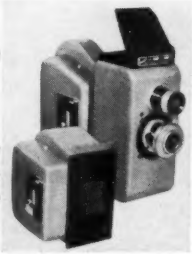

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BC FLASH BOX

(*continued from page* 89)

Step 1. Make the battery bracket out of thin sheet metal. Dimensions are shown on diagram below. Then make the capacitor mounting bracket out of a ½-in. wide band of the sheet metal. Bend it to fit the capacitor and trim the ends flush. Drill a 1/16-in. hole in the bracket to allow for the rivet. The rivet illustrated is available at most dime stores. Rivet capacitor in place.

Step 2. Drill the holes in the case. One of the simplest methods of accurately locating the holes is to draw up a paper template actual size, tape it to the case and center punch the spots indicated. (Full size templates of the brackets and the case are available. Send a stamped, self-addressed envelope to PMI, BC Flash Box, 33 W. 60 St., New York 23, N.Y.) At Schwartz's lab they use Greenlee punches for the socket holes. Most radio and TV repair shops will punch these two holes for a minimal charge or you can drill a series of tiny holes around the circumference of the socket holes and dress up the rough edges with a rat-tail or half-round file.

Now that the case is ready and the brackets are made you can start the actual assembly. First mount the potentiometer because the plug sockets overhang the potentiometer base.

Step. 3. Wire two short leads (approximately 6-in.) to the neon indicator lamp and screw it in place. Wiring the indicator lamp can be accomplished with all the components in place but it is much simpler to do it ahead of time. Now mount the sockets and the battery bracket with the batteries and capacitor in place.

Step 4. Wiring may now be completed. Although they use precut and color coded wires at Schwartz's most do-it-yourselfers will probably do the wiring from point to point. Point to point wiring is simply starting with one point and wiring to the next and so on through the entire circuit. Once one end of the wire is soldered in place it is stretched to the next point, snipped off and soldered. The capacitor leads are bare and must be covered with spaghetti (plastic tubing) before wiring in place. Don't wire the batteries until last unless you like getting shocked. Schwartz offers two tips on soldering: First, heat the work with the iron to the point where it melts the solder. This will insure a good electrical connection. Second, don't overheat the battery terminals when

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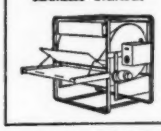

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soldering because they will loosen if they get too hot.

Now that the box is completely wired, the case cover should be attached. The shutter and lamp sockets can be marked with a touch of paint or if you have an engraving machine handy make up some plastic engraved labels similar to the one illustrated. One last touch which Schwartz adds to his box is a beaded chain loop, available at most hardware stores, which makes it easy to hang the box in a convenient place while shooting.

Using the box

In actual use the setting of the potentiometer is not critical. Turn the potentiometer all the way to the left for use with a single lamp and all the way to the right when using 10 lamps. Middle position is for 5 lamps, etc. With a roll of No. 18 wire and the snap-on plugs and sockets you can make up a set of series wired lamp receptacles as illustrated. The push button switch can be plugged into the shutter socket on the box for open flash pictures.

For those of our readers who don't care to make it themselves Milton J. Schwartz sells the box, including the series wired cords, for $37.50. His lab is located at 225 E. 44th St., New York, N.Y.—THE END

CONSTRUCTION CHEESECAKE

(*continued from page* 39)

Shulman advises cameramen to stay away from flash-on-camera when called upon for fast record shots. "Set up a few lights and include some background. Your boss will appreciate the fact that you cared enough to take some pains with lighting, even though he won't know what you did or why you did it."

A professional for almost 25 years, Shulman's first architectural photographs were of a house designed by Richard Neutra. The architect liked them very much and recommended Shulman to other architects. He soon graduated from the vest-pocket camera used on the Neutra house to a view camera. Now, he also uses a Hasselblad Superwide in addition to the view camera. His films, Super Hypan, Tri-X and Super-XX (4 x 5) are developed in UFG. Prints are made on Medalist and, occasionally, Polycontrast. A list of his clients is almost a blue-chip roll call of American industry, including U. S. Steel, Alcoa, American Airlines, Bethlehem Steel, etc.—THE END

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LETTERS

(*continued from page* 10)

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Herewith we rediffuse your request. —Ed.

To the Editor:

In reading through the May issue of your publication, I noted with a great deal of interest that you had an article on Socony Mobil's reproduction department. However, my interest turned to dismay as I read a caption beneath their collator that referred to the machine as a "Thomas collator." It is not a Thomas. It is a Macey collator and it bears no resemblance to anything Thomas makes.

I suppose every issue of every magazine has an error in it someplace. You know now where it is in this issue. We're happy to see pictures of our equipment in publications such as yours but we would prefer not to give credit to our competitors in the captions.

D. W. Richards
Macey Co.
Cleveland, Ohio

COMING UP

(*continued from page* 13)

Meetings first or second Wednesday of each month. Contact Ed Warnecke, Eastman Kodak Co., 342 Madison Ave., New York, N.Y. MU 7-7080.

Binghampton Chapter SPSE Meetings every third Tuesday. Contact H. G. Morse, Ansco, Binghampton, N. Y. RA 2-4221, Ext. 573. **New York Chapter SRE** (Society of Reproduction Engineers). Meetings first Monday. Contact B. A. Barnett, IBM Graphic Services, 590 Madison Ave., N.Y. 22, N.Y., PL 3-1900.

Rocky Mountain Industrial Photographers Meetings every fourth Monday. Contact P. H. Broadie, 2170 S. Lincoln, Denver 10, Colo. PEarl 3-2200.

Southern California Chapter SPSE Meetings the last Monday of each month. Contact Ben Augustine, 235 Annandale Rd., Pasadena 2, Calif. Telephone MU 1-0076. **Southern California Chapter Industrial Photographers.** Meetings every third Tuesday. Contact Janet Marshall, Executive Secretary, 5463 Virginia Ave., Los Angeles 29, Calif. HO 5-6614.

Many groups do not meet during summer months—Ed.

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KIER PHOTO SERVICE
Dept. PMI, 1220 W. 6th St., Cleveland 13, Ohio

Get more information. Circle 460, page 85

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for the particular artist
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MOVIELAB BUILDING
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JUdson 6-0367

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BLACK & WHITE
reversal printing
and processing

COLOR
PRINTING

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A&B Roll Prints •
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Timed Prints •
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Circular B

LAB-TV
723 Seventh Ave. at 48th St., N. Y. 19
11th FLOOR • JUdson 6-2293

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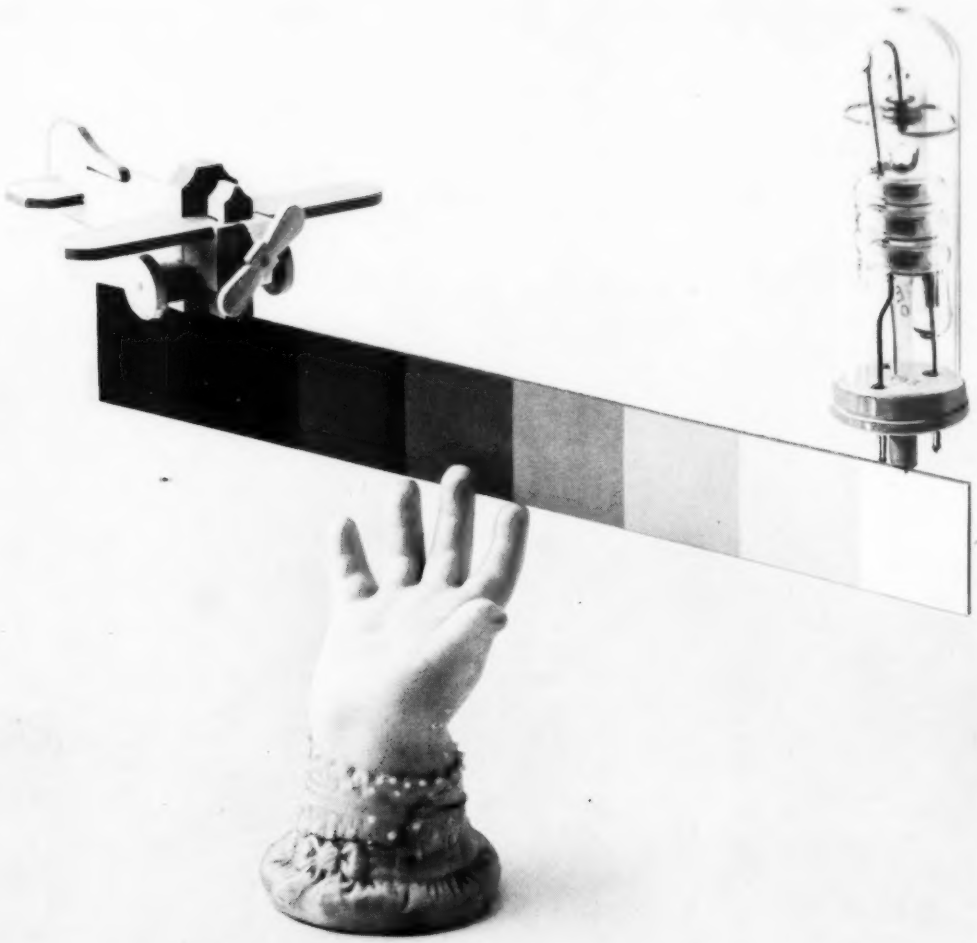

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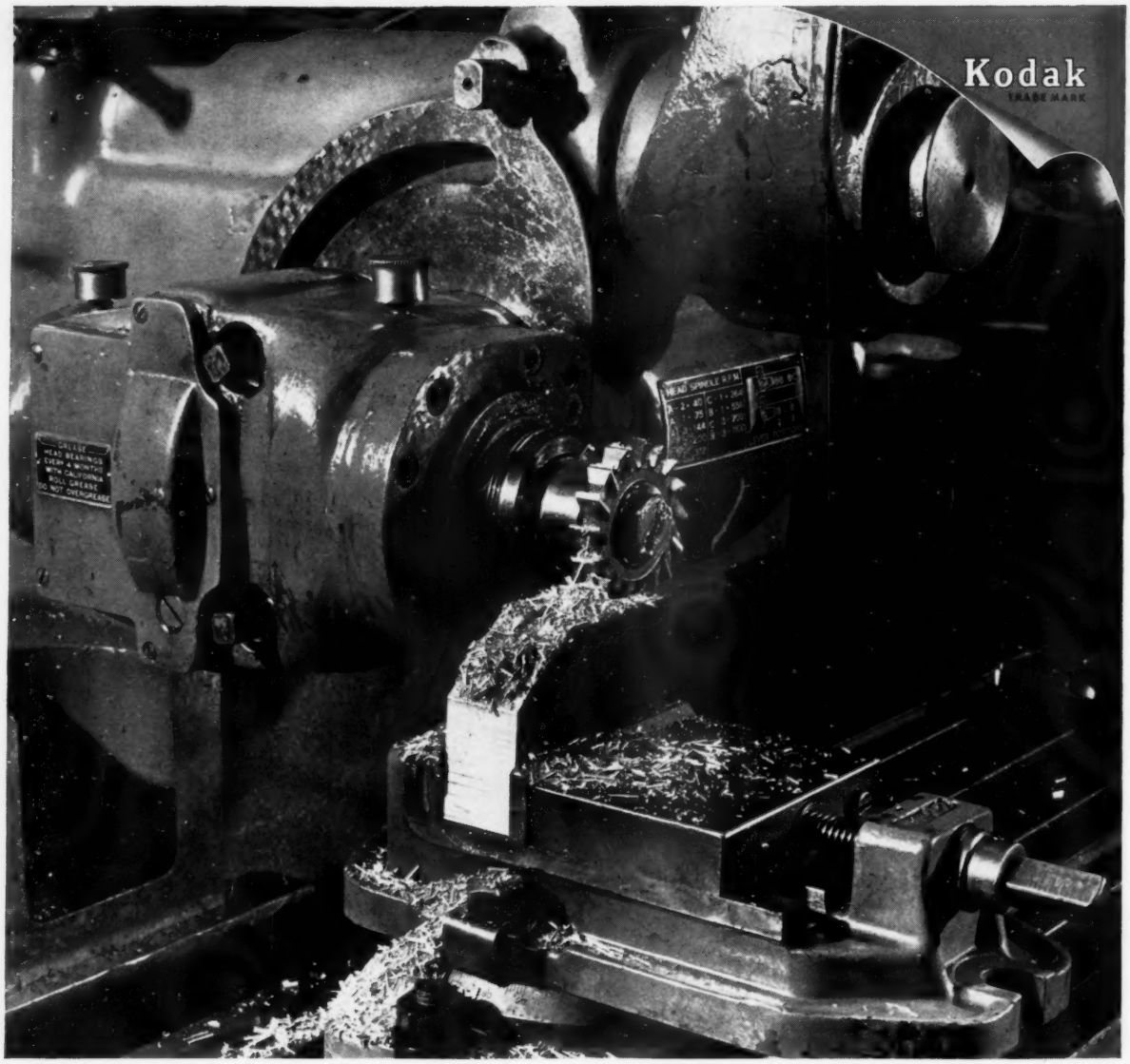
Get more information. Circle 403, page 85



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